A COMPARATIVE STUDY OF LAPAROSCOPIC APPENDECTOMY VERSUS OPEN APPENDECTOMY IN TERMS OF POSTOPERATIVE PAIN, POST OPERATIVE COMPLICATIONS, DURATION OF THE HOSPITAL STAY, RETURN TO THE WORK, COSMETIC BENEFIT, DURATION OF TIME OF THE SURGERY IN OUR INSTITUTION

A PROSPECTIVE STUDY

Dissertation submitted to

THE TAMILNADU Dr. M. G. R. MEDICAL UNIVERSITY

In partial fulfillment of the regulations for the award of the degree of

M. S. GENERAL SURGERY (BRANCH I)

CHENGALPATTU MEDICAL COLLEGE

THE TAMILNADU Dr. M. G. R. MEDICAL UNIVERSITY

CHENNAI, TAMILNADU

APRIL 2016

DECLARATION

I, **Dr. P.SATHISH PRABHU**, solemnly declare that the dissertation **"A COMPARATIVE STUDY OF LAPAROSCOPIC APPENDECTOMY VERSUS OPEN APPENDECTOMY IN TERMS OF POSTOPERATIVE PAIN, POST OPERATIVE COMPLICATIONS, DURATION OF THE HOSPITAL STAY, RETURN TO THE WORK, COSMETIC BENEFIT,DURATION OF TIME OF THE SURGERY IN OUR INSTITUTION."**

A PROSPECTIVE STUDY

A bonafide work done by me in the Department of General Surgery, Chengalpattu Medical College, Chengalpattu, Under the guidance of **PROF. Dr.T.RAGHUPATHY. M.S**, Professor, Department of General Surgery, Chengalpattu Medical College , Chengalpattu .

Place: Chengalpattu. **(DR.P.SATHISH PRABHU)**

Date:

CERTIFICATE

This is to certify that this dissertation titled "**A COMPARATIVE STUDY OF LAPAROSCOPIC APPENDECTOMY VERSUS OPEN APPENDECTOMY IN TERMS OF POSTOPERATIVE PAIN, POST OPERATIVE COMPLICATIONS, DURATION OF THE HOSPITAL STAY, RETURN TO THE WORK, COSMETIC BENEFIT,DURATION OF TIME OF THE SURGERY IN OUR INSTITUTION . A PROSPECTIVE STUDY**" has been prepared by **DR. P.SATHISH PRABHU,** under my supervision in the Department of General Surgery, Chengalpattu Medical College, Chengalpattu, during the academic period 2013 – 2016, and is being submitted to The Tamilnadu Dr. M.G.R. Medical University, Chennai, in partial fulfillment of the University regulation for the award of the Degree "Master Of Surgery" (M. S., General Surgery) and his dissertation is a bonafide work.

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GUIDE CERTIFICATE

This is to certify that the dissertation entitled, **"A COMPARATIVE STUDY OF LAPAROSCOPIC APPENDECTOMY VERSUS OPEN APPENDECTOMY IN TERMS OF POSTOPERATIVE PAIN, POST OPERATIVE COMPLICATIONS, DURATION OF THE HOSPITAL STAY, RETURN TO THE WORK, COSMETIC BENEFIT, DURATION OF TIME OF THE SURGERY IN OUR INSTITUTION. A PROSPECTIVE STUDY** submitted by the candidate Dr.P.Sathish prabhu partial fulfillment for the award of the degree of MASTER OF SURGERY by The Tamilnadu Dr.M.G.R.Medical University, Chennai is a record of original work done by him under my guidance and supervision in the Department of general surgery, Chengalpattu Medical College, Chengalpattu during the academic year 2013-16.

Place : Chengalpattu
Date :

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Dr.P.Sathish Prabhu,
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2. Patient information sheet and informed consent form in English and / or
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3. Investigators Brochure, dated _____version
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INTRODUCTION

In surgical practice Acute appendicitis is one of the common causes of acute abdomen encountered, requiring emergency surgery.

The life time rate of appendectomy is 12% for men and 25% in women, with approximately 7% of all people undergoing appendectomy for acute appendicitis during their lifetime. It has been observed that males had higher rates of appendicitis than females for all age groups with an overall ratio of 1.2:1.3.

Even though modern diagnostic facilities, surgical skills, antibiotic therapy have brought down the mortality from 30% (before 1920) to less than 0.001% persons, still the morbidity is around 5-6% mainly due to delayed diagnosis &

treatment, with the resultant complications.

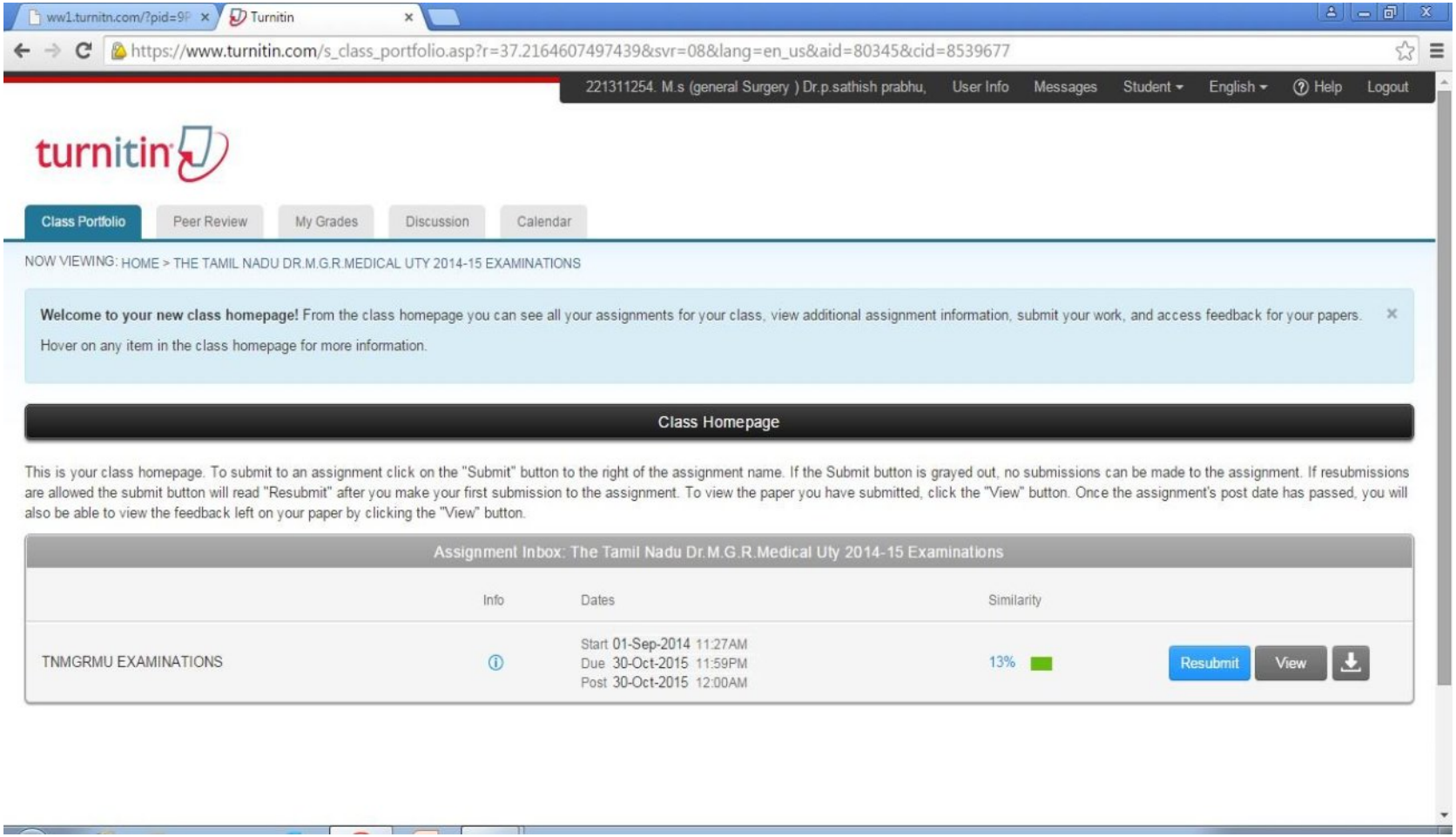
In acute appendicitis however, a treatment delay of even a few hours may result in stormy complication.

It has been said that nothing can be so simple nor yet so difficult as the diagnosis of acute appendicitis.

With the introduction of the laparoscopic technique it provided an opportunity

to explore new method of therapy in the management of the suspicion of acute appendicitis.

Laparoscopic appendectomy combines the advantages of treatment and diagnosis in one procedure with the least morbidity. Patients are likely to have less post operative pain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ABSTRACT

Background and objectives:

Laparoscopic appendectomy has rapidly become established as the popular alternative to open appendectomy, it has a safety profile better than open procedure.

Objectives:

Laparoscopic procedure for appendectomy is compared with open surgical Technique with respect to:

• Duration of procedure.

• Post operative pain.

• Cosmetic benefit

• Complication encountered

• Post operative length of hospital stay.

• Return to the work

Methods:

Prospective study from JULY 2014 to AUGUST 2015, involved 60 patients with Diagnosis of acute appendicitis was entered into a study randomizing the Choice of operation to either the open or the laparoscopic technique. Statistical Comparisons were performed using the chi-square test and students 't' test.

Results:

In the study, the mean post op pain score was recorded at the end of 24 hours for laparoscopic appendectomy is 1.37±0.49 and for open appendectomy is 3.27±0.828. The parameter difference is significant $p<0.0001$.

In the study, 6 (20%) patients in laparoscopic group and 16 (53.3%) patients in open group had post op vomiting. The difference was significant ($p<0.007$).

In the study, 8 (26.7%) patients in open group and 4 (13.3%) patients in laparoscopic group had post op fever

In the study, 8 (26.7%) patients in open group and 1(3.3%) patients in laparoscopic group had post op wound infection. The difference was significant ($p<0.01$)

In the study, The mean hospital stay score was 1.77 ±0.728 days in laparoscopic group and 7.73 ±1.363 days in open group.The difference was significant ($p<0.0001$)

In the study, the mean score return to work was 9.6 days in laparoscopic and 17.67 days in open group. The difference was significant $p<0.0001$

In the laparoscopic group, 26 (86.7%) patients were satisfied with cosmetic benefit, 4 (13.3%) patients were equivocally satisfied, 0 patients were unsatisfied.

In the open group, 15(50%) patients were satisfied, 8 (26.7%) were equivocally satisfied, 7 (23.3%) patients were unsatisfied with cosmetic benefit.

The study show that laparoscopic group had better cosmetic results

In the study, the mean score for duration of time of surgery was 36.17±12.25 minutes in laparoscopic group and 17.5 ±5.211 minutes in open group.

CONCLUSION

Laparoscopic appendectomy was better than open appendectomy in a properly prepared and selected patient in terms of Post operative pain, Post operative complications like vomiting, wound infection, fever, Duration of the hospital stay, Return to the work, Cosmetic benefit.

Overall, laparoscopic appendectomy is better than open appendectomy in the properly selected patients of acute appendicitis at the cost of increase in the duration of the time of surgery.

KEY WORDS

Acute appendicitis, appendectomy, Open procedure, laparoscopy procedure.

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LIST OF ABBREVIATIONS

Vs	-	Versus
CT	-	Computerized tomography
USG	-	Ultrasound
W.B.C	-	White blood count
IgG	-	Immunoglobulin
RIF	-	Right iliac fossa
CO2	-	Carbon dioxide
PA View	-	Posterior anterior view
ECG	-	Electrocardiogram
HIV	-	Human immunodeficiency virus
HbsAg	-	Hepatitis B surface antigen
N	-	Number

INTRODUCTION

In surgical practice Acute appendicitis is one of the common causes of acute abdomen encountered, requiring emergency surgery.

The life time rate of appendectomy is 12% for men and 25% in women, with approximately 7% of all people undergoing appendectomy for acute appendicitis during their lifetime. It has been observed that males had higher rates of appendicitis than females for all age groups with an overall ratio of 1.2:1.3

Even though modern diagnostic facilities, surgical skills, antibiotic therapy have brought down the mortality from 50% (before 1925) to less than 0.001% persons, still the morbidity is around 5-8% mainly due to delayed diagnosis & treatment, with the resultant complications.

In acute appendicitis however, a treatment delay of even a few hours may result in stormy complication.

It has been said that nothing can be so simple nor yet so difficult as the diagnosis of acute appendicitis.

With the introduction of the laparoscopic technique it provided an opportunity to explore new method of therapy in the management of suspected acute appendicitis.

Laparoscopic appendectomy combines the advantages of treatment and diagnosis in one procedure with the least morbidity. Patients are likely to have less

post operative pain and to be discharged from hospital and return to regular activities of daily living quicker than those who underwent an open appendectomy.

Other advantages include decreased wound infection, better cosmetic, ability to explore the entire peritoneal cavity for diagnosis of other conditions and effective peritoneal toileting without the need for extending the incision.

Laparoscopic appendectomy is increasingly being used particularly in young females of child bearing age where the differential diagnosis of right lower quadrant pain is extensive including gynecologic pathology.

Critics of laparoscopic appendectomy often point to the increased cost of the surgical equipments as a major disadvantage of the laparoscopic procedure. Despite these concerns however the cost effectiveness for the laparoscopic appendectomy is easily realized once the decreased hospital stay and entire patient covalence period are accounted.

The modern era of laparoscopic surgery has evoked remarkable changes in the Approach to surgical diseases. The trend towards minimally invasive surgery has Prompted general surgeons to scrutinize nearly all surgical procedures for possibility of conversion to the laparoscopic technique.

AIMS AND OBJECTIVES

The aim of the study is the comparison between the outcomes of Laparoscopic appendectomy and Open appendectomy in terms of

1. Post operative pain
2. Post operative complications
3. Duration of the hospital stay
4. Return to the work
5. Cosmetic benefit
6. Duration of surgery time

REVIEW OF LITERATURE

Leonardo da Vinci, clearly depicted the organ in his anatomical Drawings. He called it “Orchid” literally ear to denote the auricular appendage of the caecum in 1492.

Berengario Dacarpi first described the organ in 1521

Vido vidius first named the worm- like organ as the vermiform appendix in 1530.

Great scholar Erasmus was the first to record a case of appendicitis with Abscess formation in 1530

Andreas Vesalius illustrated the normal appendix in his ‘De Humani corporis Fabrica’ in 1543

Zeanfernel French physician described a case of perforated appendix After an autopsy on 7 year girl who had suffered from diarrhea and was given large Quince to stop her bowels in 1554

Hiden, a leading German surgeon gave detailed account of diseased Inflamed appendix, after autopsy on a young man who died after several years of progressive intestinal pain in 1652. The appendix was shrunken and drawn into the small bowel completely filling it, so that no contents could be forced into the colon, therefore such pain. Appendix was inflamed and swollen throughout.

Verneys was the first to coin the term appendix vermiformis, the first description of appendicitis in 1710.

Lorenz Hester gave the first good description of a case of acute appendicitis –a postmortem on an executed criminal in 1711.

Morganin (1719) illustrated beautifully in his Adversaria anatomica.

Claudis Amyand, surgeon to West minister and St. Georges hospitals and sergeant surgeon to George performed the first appendectomy in 1736. He operated on a boy of 11 years who had a right scrotal hernia accompanied by fistula, within the scrotum was found appendix perforated, the appendix was ligated and all or a part of it was removed with recovery of the patient.

Heister recognized that the appendix might be the site of acute primary inflammation in an autopsy on the body of a criminal who had been executed in 1755.

The first textbook, that gave the description of the symptoms of inflammation and perforation of the appendix was by Bright and Addision in 1839.

Reginald Fitz coined the term "Appendicitis" and recommended early surgical intervention for the disease in 1886.

Charles McBurney presented a report on early operative intervention for acute appendicitis to the New York surgical society in 1889. 5 years later, he formalized the procedure and described the McBurney's incision.

Murphy clearly described the appropriate sequence of symptoms of pain followed by nausea and vomiting with fever and exaggerated local tenderness at the position occupied by the appendix in 1905.

One of the most recent trends in the surgical therapy involves the use of minimal invasive laparoscopic procedure.

A German gynecologist Kurt Semm, introduced laparoscopy as a method for the removal of a diseased appendix which was incidentally picked up during a gynecologic procedure in 1983.

Pier A, Gotz F, Bacher C., published the first large series of laparoscopic appendectomies for acute appendicitis and , demonstrated that the procedure could be applied to most cases of appendicitis with a high degree of success, a low complication rate, operative speed comparable to a traditional open appendectomy in 1991.

Attwood sehill and et al in his study concluded that laparoscopic appendectomy is superior to open appendectomy in terms of hospital stay ,post operative complication and return to normal activities and is recommended as a approach of choice in case of acute appendicitis in 1992.

Gurbas at, Peetz me et al concluded in pregnant women that laparoscopic appendectomy does not increase in maternal and fetal morbidity or mortality as compared to open appendectomy in 1997.

Heikkinen T. J. et al compared of outcome and cost benefit of laparoscopic appendectomy Vs open appendectomy. 19 patients underwent lap appendectomy and 21 underwent open appendectomy in 1998. They found that median operating time of laparoscopic appendectomy was 91 min and open was 82 min.

No difference in post operative pain or fatigue was noted. Return to normal activities was 14 days in case of lap. Appendectomy compared to 26.5 days in case of open and the hospital cost for lap. Appendectomy was $8538 compared to open $6788.

Hence, concluded that laparoscopy appendectomy was as safe as open, the hospital cost are higher but laparoscopic appendectomy offers significant cost saving to the payer for working patient because of early resumption of work.

A prospective evaluation of laparoscopic surgery for acute appendicitis over a 6 month period is reported. 65 patients with signs & symptoms of appendicitis Necessitating surgery was assigned to the open or laparoscopic modality. The result suggested that emergency laparoscopic appendectomy should be explored further as an alternative to open surgery for acute appendicitis.

A comparative study concluded that laparoscopy is a useful adjunct to the management of patients with a presumed diagnosis of appendicitis.

A meta-analysis of 35 randomized controlled trials revealed that the operating time was significantly longer for laparoscopy and hospital stay was shorter.

Operating time reduced markedly for laparoscopy on subgroup analysis. The risks of postoperative ileus and wound infection are lower for laparoscopy. The risk of intraabdominal abscess development is significantly raised after laparoscopy with an odds ratio of 2.26 (P=0.0002). It concluded that laparoscopic appendectomy is a safe and effective method of treating acute appendicitis.

A study comparing the two procedures concluded that patients who underwent laparoscopic appendectomy have a shorter duration of analgesic use and an earlier return to full activities postoperatively when compared to patients who underwent open appendectorny. 253 patients with acute appendicitis were randomized into three groups.

Laparoscopic appendectomy with an endoscopic linear stapler (LAS on 78 patients, laparoscopic appendectomy with catgut ligatures (LAL) on 89, and open appendectomy (OA) on 86. It concluded that, laparoscopic appendectomy has distinct advantages. The laparoscopic procedure produces less pain (2.01) and allowed more rapid return to normal work, and LAS required a shorter hospital stay. The only disadvantage of laparoscopic approach is the increased operative time compared to open method.

A meta-analysis of randomized control trials concluded that, laparoscopic appendectomy offers significant improvement in postoperative outcome at the cost of a longer duration of operation.

In a randomized control trial involving 583 consecutive patients, 301 patients were allocated to open appendectomy and 282 to laparoscopy, 65 of who required

conversion to open appendectomy. It concluded that hospital stay was equally short. Laparoscopic appendectomy was associated with fewer wound infections, faster recovery, earlier return to work and improved cosmesis.

A study of randomized control trials, concluded that the therapeutic outcomes favoring laparoscopic appendectorny include reductions in wound infection rate, post operative pain on day 1, hospital stay in days , return to normal activity in days , earlier return of normal bowel function and overall cost.

A retrospective study of 43,757 patients concluded, laparoscopic appendectomy has significant advantages over open appendectomy with respect to length of hospital stay, rate of routine discharge, and post operative in-hospital morbidity.

A study of prospective, randomized clinical trial found that, the laparoscopic procedures produce less pain, required a shorter duration of hospital stay and allowed a more rapid return to full activities.

Laparoscopic appendectomy presents as a safe and an effective alternative to open surgery when utilized in a competent manner. Advantages including a shortened hospital stay, reduced incidence of wound infection, and hastened convalescence justify a moderately increased operating room expense secondary to advanced instrumentation.

In another study done, laparoscopy had the distinct advantage of picking up additional pathology which included intra-abdominal bowel adhesions, ovarian cysts, Meckels diverticulum, & a sigmoid perforation in one instance. S.Laine a

Rantal et al concluded that younger women with right iliac fossa pain laparoscopic can give precise diagnosis and reduce the rate of negative appendectomy. Utpal de concluded in his study that laparoscopic appendectomy was associated with increase clinical comfort in terms of fever, lower wound infection, faster recovery earlier return towards and improved cosmesis.

In 2007 Yong JL, Law WL, Lo CY, et al during their study period 82 patients underwent LA (Group A) and 119 underwent OA (Group B). The median durations of surgery in Group A and Group B were 80 minutes (range, 40 to 195) and 60 minutes (range, 25 to 260), respectively ($P<0.005$). Postoperative complication rates were comparable between the 2 groups (13.4% in Group A versus 15.8% in Group B). The median hospital stay for patients in Group A and Group B were 3.0 days (range, 1 to 47) and 4.0 days (range, 1 to 47), respectively ($P = 0.037$). Hence they conclude that routine laparoscopy and LA for suspected acute appendicitis is safe and is associated with a significantly shorter hospital stay compared to open append ectomy. Other intra-abdominal pathologies can also be diagnosed more accurately with the laparoscopic approach.

Shaikh AR, Sangrasi AK, Shaikh GA in their study provides certain advantages over open appendectomy, including short hospital stay, decreased requirement of postoperative analgesia, early food tolerance, and earlier return to normal activities. Where feasible, laparoscopy should be undertaken as the initial procedure of choice for most cases of suspected appendicitis. In 2009 Yasmin Vellani,1 Shaheena Bhatti,2 Ghina Shamsi,3 Yasmin et all: in their study a total of

49 patients' clinical charts were reviewed. Of these, 29 patients 12 had laparoscopic appendectomies and the remaining 20 had open appendectomies.

The mean post-operative stay in days was relatively shorter for laparoscopic appendectomy (1.97 ± 2.3) compared to open appendectomy (3.1 ± 1.8). The average time for the return of bowel movement was remarkably lesser for laparoscopic appendectomy (10.6 ± 8.2) hours than open appendectomy (21 ± 13) hours. Hence, our study found that laparoscopic appendectomy, although relatively expensive, is a safe and effective procedure for the removal of appendix over open appendectomy.

In 2009 Getha K R. Annappa Kundva .Bhavatej concluded that laparoscopic appendectomy was better than open appendectomy with respect to wound infection rate ,early resumption of oral feeds, postoperative pain , lesser use of analgesics , postoperative hospital stay and return to normal activities. Although above mentioned advantage were at the cost of slightly increased duration of surgery and cost of surgery.

APPENDIX

EMBRYOLOGY

Appendix and caecum develop from the caecal bud as a diverticulum that arises from the post arterial segment of midgut loop. The proximal part of the bud grows to form the caecum. Its distal part remains narrow and forms the appendix. During the greater part of fetal life the appendix arises from the apex of Caecum. Subsequently the lateral wall of the caecum grows much more rapidly than the medial wall with the result the point of attachment of appendix comes to lie on medial side into a retrocaecal and intraperitoneal position.

Rarely the caecum does not migrate during development to its normal position in the right lower quadrant of abdomen .In such cases we came across a sub hepatic appendix or situs inversus totalis, in which the appendix is in left iliac fossa, causing diagnostic difficulty if appendicitis develops.

CONGENITAL ABNORMALITIES OF THE APPENDIX

- Congenital absence
- Duplication or Triplication
- Variations of position of appendix
- Congenital diverticulum or band of appendix

WALLBRIDGE CLASSIFICATION.(DUPLICATION OF APPENDIX)

- Type A. Partial duplication in a single caecum
- Type B. Two separate appendices in a single caecum
- Type C. Double caecum with each one having one appendix.

POSITIONS OF THE APPENDIX

- 1. Retrocaecal (64%)
- 2. Pelvic (32%)
- 3.preileal (1%)
- 4. Postileal (0.5%)
- 5.Paracaecal (2%)
- 6. Subcaecal (1.5%)
- 7.Subhepatic

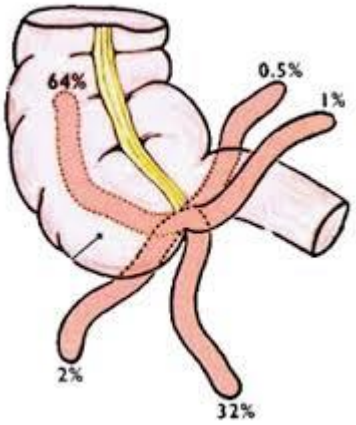


Figure A

APPENDIX : ANATOMY

- Vermiform appendix is the narrow tube which arises from the posterior medial caecal wall, 2cm below the end of the ileum.
- On the base of the appendix the three taeniae coli of the caecum join into its longitudinal muscle.
- The appendix can be traced by identifying anterior taenia coli.
- Length of the appendix 2 to 20 cm (average 9cm).
- Diameter of the appendix 5-7mm.
- The appendix is connected by short mesoappendix to the ileal mesentry.
- The lumen of the appendix is small and opens into the caecum by an orifce guarded by valve of gerlach, lying below and posterior to the ileocaecal opening.

VASCULAR SUPPLY

The main appendicular artery, a branch of ileocolic artery, runs behind terminal ileum and enters the mesoappendix. Here it gives off a recurrent branch, which anastomosis at the base of the appendix with a branch of the posterior caecal artery.

Often accessory artery (artery of seshachalam) may be present.

Appendicular veins drain into the posterior caecal or ileocolic vein and then drain into the superior mesenteric vein

LYMPHATICS

Abundant lymphoid tissue present in the wall of the appendix.

All lymphatic's join to form three larger vessels which drain into the lymphatic's draining the ascending colon and end in the inferior and superior ileocolic chain of nodes.

NERVE SUPPLY

The parasympathetic and sympathetic nerves from the superior mesenteric plexus supply the appendix.

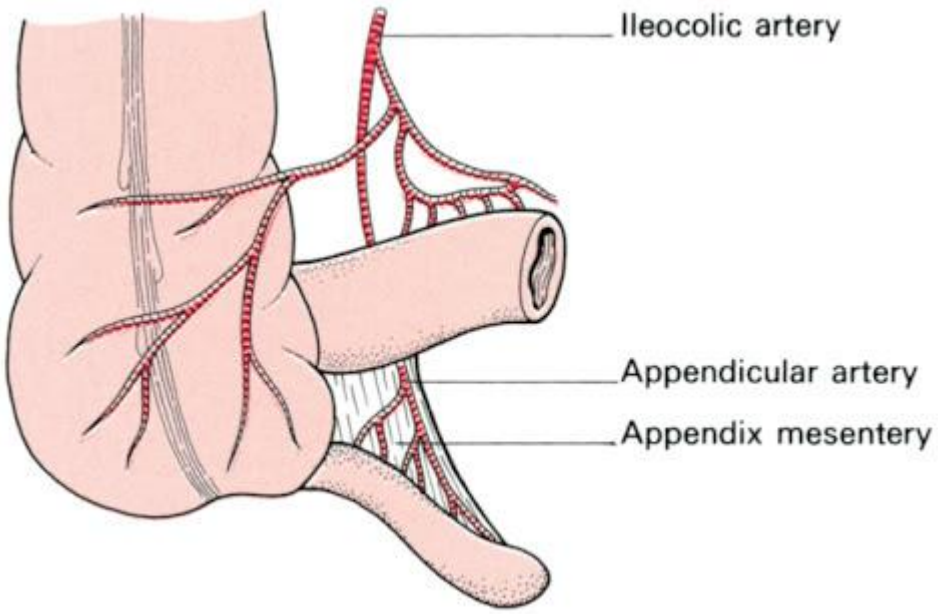


Figure B

APPENDICITIS –AETIOLOGY

- Reduced fibre diet causes appendicitis
- More common among young males , white races
- Common in May and August-seasonal variation –epidemic appendicitis
- Family history relevant in 30% cases
- Viral infection causes mucosal edema and later infected by bacteria leads to appendicitis
- Distal colonic obstruction
- Abuse of purgatives
- Faecolith
- Obstruction of lumen of appendix due to stricture, roundworm and foreign body.

ORGANISMS CAUSING APPENDICITIS

- E.coli (86%)
- Enterococci(30%)
- Streptococci
- Anaerobic
- Clostridium welchii
- Bacteroides.
- Mixed growth of aerobic and anaerobic is usual

PATHOGENESIS

- Acute non obstructive appendicitis is caused by mucous membrane inflammation with secondary infection without obstruction causes. It may lead into resolution, fibrosis, recurrent appendicitis, or even into the obstructive appendicitis.
- Luminal obstruction leads to mucus and inflammatory fluid collects inside the lumen which increases intraluminal pressure leads to blockage of lymphatic and venous drainage resulting in increased edema of mucosa and causes mucous ulceration and ischemia, along with bacterial spread through submucosa and muscularis propria leads into the acute obstructive appendicitis.
- Thrombosis of appendicular artery along with obstructive appendicitis leads into the ischemic necrosis of full thickness of the wall and gangrene of appendix sets in , which leads into perforation of tip or base leads into peritonitis
- After perforation , localization by greater omentum and dilated ileum occurs leads to suppuration and pus inside –appendicular abscess
- Localization can occur by omentum and dilated ileum without pus inside-appendicular mass
- Sometimes obstruction of lumen leads to mucus collects inside resulting in mucocele of the appendix.

RISK FACTORS FOR PERFORATION OF THE APPENDIX

- Immunosuppression and extremes of age
- Diabetes mellitus, previous abdominal surgery
- Faecolith, pelvic appendix

ACUTE NON OBSTRUCTIVE CATARRHAL APPENDICITIS

Inflammation of mucous membrane leads into the

- Resolution
- Ulceration and Suppuration
- Fibrosis
- Recurrence
- Gangrene
- Peritonitis

ACUTE OBSTRUCTIVE APPENDICITIS

Lumen of appendix blocked along with pus collects inside leads into gangrene and perforation of the appendix at tip or base leads into appendicular abscess Thrombosis of the appendicular artery associated .

RECURRENT APPENDICITIS

Repeated attacks of non obstructive type leads to fibrosis, adhesions causing recurrent appendicitis

SUBACUTE APPENDICITIS

Milder form of acute appendicitis.

STUMP APPENDICITIS

It is retained long stump of inflamed appendix. Occurs mostly commonly after laparoscopic appendectomy.

MICROSCOPIC

- Mucosal edema, congestion, polymorphonuclear inflammatory cells in the mucosa, focal areas of mural ulceration and crypt abscess

MACROSCOPIC

- The external appearance often depends on the underlying pathology. The appendix size and serosa may normal.
- From a normal shiny appearance of the serosa, the spectrum ranges through patchy hyperemia to continuous congestion.
- Diameter of the appendix extends up to 1 cm as the process extend to later severe stage.
- Focal gangrene necrosis of the wall. Frank perforated area seen.

CLINICAL PRESENTATION

SYMPTOMS

- Peri umbilical pain
- Pain shift to right iliac fossa
- Anorexia
- Nausea and vomiting

MURPHYS TRIAD

- Pain
- Vomiting
- Temperature

APPENDICITIS: COMMON SYMPTOMS

COMMON SYMPTOMS	FREQUENCY
Pain in abdomen	100%
Loss of appetite	100%
Nausea	90%
Vomiting	75%
Migrating pain	50%
Classic symptom sequence	45%

- Onset symptoms occur within the past 24 to 36 hours.
- A thorough history of abdominal pain and recent gynecological, genitourinary history of the patient should be elicited.

SIGNS OF APPENDICITIS

- Pyrexia
- Localized tenderness in right iliac fossa
- Muscle guarding
- Rebound tenderness

SIGNS TO ELICIT APPENDICITIS

COPES PSOAS TEST;

Right thigh pain on extension:–retroperitoneal retrocaecal appendix.

OBTURATOR TEST

Right thigh pain on internal rotation:–pelvic appendix

ROVSING SIGN

Pain in the right iliac fossa on pressing the left iliac fossa, due to shifting of intestinal loops causing irritation of the parietal peritoneum.

DUNPHYS SIGN

Increased right iliac fossa pain on coughing.

AARON SIGN

A sensation of epigastric pain and distress on pressure over Mcburney s point

BLUMBERG SIGN

Release sign, due to the presence of an inflamed organ underneath it

ALDER'S SIGN (DIAGNOSE APPENDICITIS IN PREGNANCY)

Mark the most tender point, then on turning the patient to left side, tenderness of uterine origin will shift, while appendix pain remain in the same point.

FEATURES ACCORDING TO THE AGE

ACUTE APPENDICITIS IN INFANCY

Even though it is rare, when it occurs, it has got 85%chances of perforation with high mortality (55%)

ACUTE APPENDICITIS IN CHILDREN

Localization is not present here and so peritonitis occurs early

Requires early surgery and intervention to prevent complications

Dehydration and septicemia are common here.

ACUTE APPENDICITIS IN ELDERLY

Because of lax abdominal wall, localization is poor and so peritonitis occurs early.

Early intervention needed.

Gangrene and perforation are common

ACUTE APPENDICITIS IN PREGNANCY

Most common non gynecologic surgical emergency during pregnancy.

Incidence of perforation is highest in 3 rd trimester. Fetal death rate is around 5 %.

Appendix pain in pregnancy and shift to upper abdomen leads to misdiagnosis. After 6 months of amenorrhea, maternal mortality increases and also leads to premature labour.

DIFFERENTIAL DIAGNOSIS

GASTRO-INTESTINAL

- Cholecystitis
- Diverticulitis
- Meckel s diverticulitis
- Enteritis
- Duodenal ulcer

- Intussusception
- Mesenteric lymphadenitis
- Necrotizing entero colitis
- Infection
- Torsion of the Omentum
- Acute Pancreatitis
- Perforated bowel volvulus
- Neoplasm (carcinoid, carcinoma, lymphoma)
- Crohn disease

Gynecological

- Ectopic pregnancy
- Endometriosis
- Ovarian torsion
- Pelvic inflammatory disease
- ovarian cyst is ruptured
- Tubo ovarian abscess

SYSTEMIC CAUSE

- Diabetic keto acidosis
- Porphyria
- Sickle cell anemia

PULMONARY

- Pleurisy
- Basilar pneumonia
- Pulmonary infarction

GENITO-URINARY

- Kidney stone
- Prostatitis and Pyelonephritis
- Urinary tract infection
- Parasitic infestation
- Psoas abscess
- Hematoma
- Testicular torsion

INVESTIGATIONS

LAB INVESTIGATIONS

Total count markedly increased around 10,000/ mm3 (range from 8000 to 14000/mm3)

Increase in count of neutrophils (Shift to left)

CRP- Elevated implies inflammation

Urine analysis to rule out genito urinary cause

PLAIN X-RAY FLIM

To find the cause of abdominal pain

Sentinel loop – A fluid level in ileum with dilated atonic ileum

Caecum is dilated and Appendix calculus about 0.5 – 6 cm

Right lower quadrant haze due to fluid and the edema

Scoliosis present and concave to right

Widening of the pre peritoneal fat

Right lower quadrant mass indenting the caecum

Right psoas outline is blurring

Gas in the appendix

ULTRASOUND

In 1986, Julian puylaert developed the graded compression technique for ultra sound examination.

7MHZ Probe used over the point of maximum tenderness in the right iliac fossa, pressure is gradually increased over the area in order to displace the bowel loops, appendix may then be seen overlying the psoas muscle.

ULTRASOUND FINDINGS

Blind end tubular structure with non compressible appendix of diameter 7mm or more with no peristalsis. Appendicolith casting acoustic shadow

Non compressible surrounding fat with High echogenicity

Surrounding fluid or abscess

Caecal pole Edema

Specificity around 85%.

FALSE NEGATIVE FINDINGS IN ULTRASOUND

Gas filled appendix

Retrocaecal appendicitis

Appendiceal tip Appendicitis

Gangrenous appendicitis

Perforated appendicitis

It may be difficult to perform the technique, if there is generlised peritonitis and perforated appendicitis may become compressible

FALSE POSITIVE FINDINGS IN ULTRASOUND

Appendicitis is resolving

Fallopian tube is dilated

Crohn disease

Inspissated stool mimicking an appendicolith.

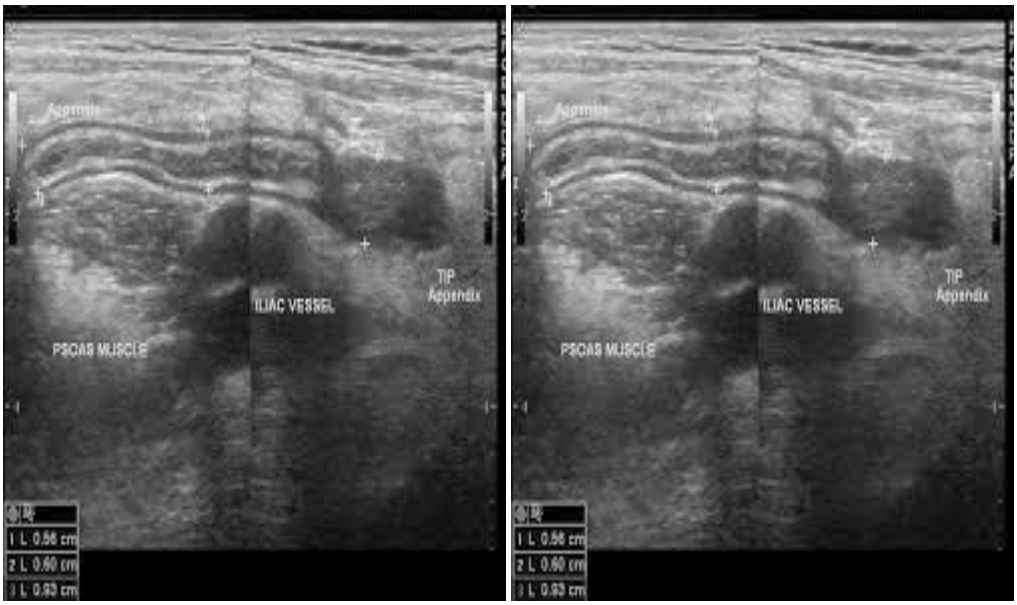


Figure C

BARIUM ENEMA

External compression of caecum

Spasm of the caecum or ileum

Non filling or partial filling of the appendix.

COMPUTED TOMOGRAPHY (C.T) IN APPENDICITIS

Spiral CT is more accurate than axial CT scan.

Scanning with oral and i.v contrast is more accurate than non contrast CT scan.

C.T FINDINGS IN APPENDICITIS

Appendicolith is present

Diameter of appendix is more than 6mm

The oral contrast or air fails to fill the appendix

The wall of the appendix is enhanced with IV contrast

Fluid, appendicular mass, thick caecum, attenuation of fat, gas in the extra luminal space, lymph nodes enlarged.

Arrow head sign: - Caecal lumen pointing towards the opening to the appendix which is obstructed

100% Specificity and Sensitivity

Figure D

NUCLEAR MEDICINE;

Two types of imaging studies to evaluate the suspected appendicitis.

1. Tc 99m WBC- radiolabelled white cells

2. Tc 99m IG -radiolabelled immunoglobulin

This method relies on the fact that the leukocyte and IG localization at the site of appendix inflammation with the use of scintigraphy.

This takes 3 hours to perform this procedure.

DIAGNOSTIC LAPROSCOPY

Useful in equivocal cases.

Avoid unwanted appendectomy

Useful in young females along with gynecological conditions.

OTHER INVESTIGATIONS

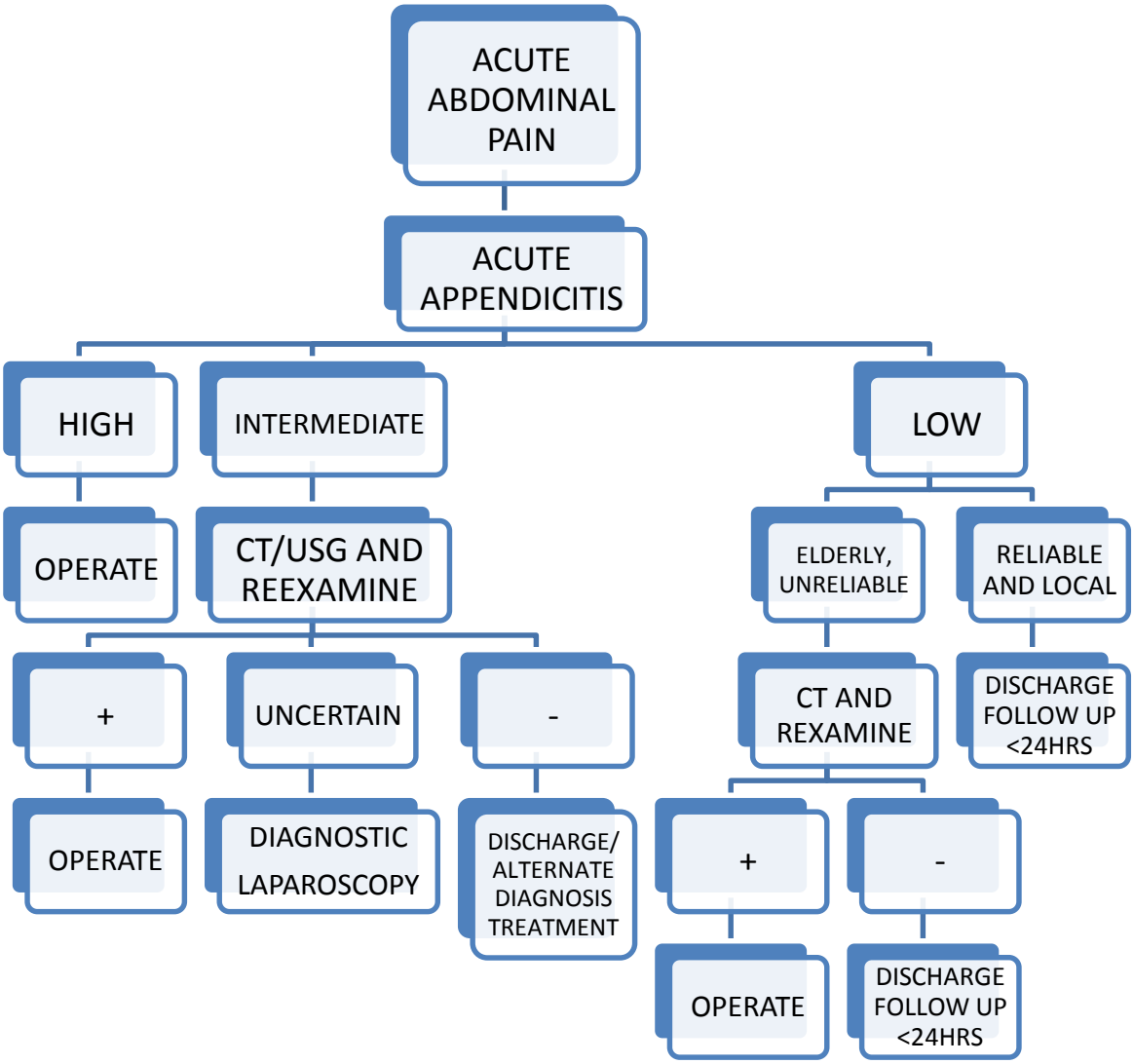
ELECTRO CARDIOGRAM, CHEST X-RAY PA VIEW

RENAL FUNCTION TEST, BLOOD GLUCOSE

LIVER FUNCTION TEST

H.I.V TEST, HBS AG TEST

PERIPHERAL SMEAR



ALGORITHM OF MANAGEMENT OF APPENDICITIS

APPENDICITIS INFLAMMATORY RESPONSE SCORE

FINDINGS	POINTS
1) Vomiting	1
2) Pain in the right iliac fossa	1
3) Rebound tenderness	
• Light	1
• Medium	2
• Strong	3
4) Body temperature >38.5 degree Celsius	1
5) Polymorphonuclear leucocytes	
a) 70-84%	1
b) >85%	2
6) WBC COUNT	
a) 10-14.9 *$1O^9$ cells/l	1
b) >15*10^9 cells/l	2
7) C Reactive protein concentration	
a) 10-49 g/dl	1
b) > 50 g/dl	2

INTERPRETATION

Score 0-4 - low probability, outpatient follow up

Score 5-8 -medium probability, active observation or diagnostic laparoscopy

Score 9 -12 -high probability, surgical exploration.

ALVARADO SCORING SYSTEM

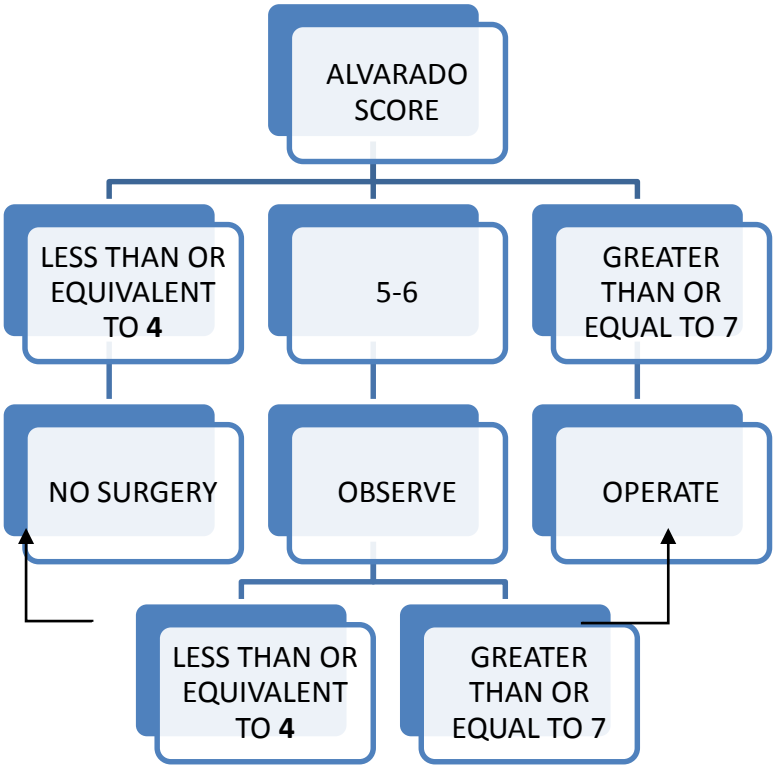
Alvarado score was accepted among numerous scoring system used for appendicitis

SYMPTOMS	**SCORE**
Migrating pain	1
Anorexia	1
Nausea and vomiting	1
SIGNS	
Tenderness in the right iliac fossa	2
Rebound tenderness	1
Elevated temperature	1
LABORATORY	
Leucocytosis with count more than 10,000	2
Shift to left with neutrophilia in peripheral smear	1
TOTAL SCORE	**10**

INTERPRETATION

Score less than 5	-	Not sure
Score between 5-6	-	Compatible
Score between 6-9	-	probable
Score more than 9	-	Confirmed.

ALVARADO SCORE



TREATMENT OF ACUTE APPENDICITIS

NON OPERATIVE MANAGEMENT

TREVES – Even prior to the advent of antibiotics. He Advocate early non operative management of acute appendicitis, COLDREY –471 patients with appendicitis treated with antibiotics and presented his study series. This treatment failed in 57 patients, 48 requiring appendectomy, 9 requiring drainage of appendicular abscess.

ERIKSSON –High rate of recurrence treated non surgically. Non operative management of appendicitis cannot be recommended based on the high failure rates. Antibiotic measure is only temporary.

OPERATIVE MANAGEMENT

The treatment for appendicitis is appendectomy

Proper preoperative work up should done

1. Intravenous fluid should be begun. Monitoring of urine output, blood pressure, pulse. Electrolyte abnormalities should be corrected.
2. Antibiotics should be given before 30 minutes of induction of anesthesia
3. Antibiotic should cover both gram negative bacteria and anaerobes
4. There should not be any delay in surgery to minimize the chances of perforation
5. Severe peritonitis, electrolyte abnormalities are present.

INCISIONS IN APPENDECTOMY

APPROACHES;

GRID IRON INCISION (MCBURNEY S INCISION)

This incision was described by MC ARTHUR. . Incision made at right angle to right spine –umbilical line at the mcburney s point. Advantages: muscle separated along its fibres and hence wound strength does not depend on stitches and prevent incisional hernia. Disadvantages: inadequate exposure in retrocaecal appendicitis and cosmetic appearance is not good.

RUTHERFORD MORRISON S INCISION

Muscle cutting incision, muscles are cut upwards and medially .Useful when appendix is paracaecal or retrocaecal and fixed. Advantages-better exposure than mc burney s and can extended in either way. Disadvantages-More bleeding , more painful in post op, time consuming. Developed by fowler in 1884 and modified by Rutherford Morrison and grey turner in 1901. Similar to grid iron incision except internal oblique and transverse abdominis are cut at right angle to its fibres .

LANZ CREASE INCISION

Cosmetically better Incision made 2-3 cm medial to the anterior superior iliac spine, extended medially to the line of a skin crease over mcburney s point.

THE PARAMEDIAN INCISION

Organ is comparatively inaccessible in this approach.

Possible to contaminate the peritoneum medially in cases where the infection was localized .Valuable when the diagnosis in doubt. Useful in elderly when other conditions co exists.

FOWLER –WEIR APPROACH

Incision made by cutting muscle medially over rectus, it made just below umbilicus at the level of mid clavicular line.

Advantages-exposure is good, cosmetically good scar, useful in obese patients.

Disadvantages - dissemination of infection and peritonitis.

BATTLE INCISION

Rectus sheath is incised and the rectus muscles are retracted and medial inferior epigastric vessels are avoided. Incision of peritoneum limited to prevent injury to segmental nerves. Blood less approach and exposure is good.

Disadvantages-Infection of the rectus sheath common, incision cant extended.

LAPROSCOPIC

Becoming popular and better now.

PRINCIPLES OF OPEN APPENDECTOMY

The Caecum is the most lateral structure in the abdominal cavity and is the surgical target. The skin incision is chosen to suit the surgical target.

Make an adequate skin incision; properly closed, the cosmetic blemish is not related to the length. A small incision is only permissible if the caecum and appendix can be fully delivered so that the operation is conducted outside the abdomen. If intra peritoneal procedure is to be done, then access must be much more generous.[1]

There must be no hesitation in opening the rectus sheath medially to improve the exposure.

The incision should be enlarged at first; it should be possible to remove the appendix without dragging or pulling. If the exposure proves inadequate it is often only the muscular and fascial layers that need to be further incised as the skin wound is relatively mobile.[2]

STEPS OF OPEN APPENDECTOMY

The skin is incised in the chosen line and hemostasis secured. The external oblique is then nicked, and the cut end picked up with a hemostat on each side and enlarged 3cm or so in either direction. The medial hemostat is now drawn toward the midline and the areolar tissue on the inner aspect of the aponeurosis cleared. The internal oblique muscle will now be seen at its insertion into the rectus sheath, the junction of the muscle at the lateral border of the rectus is the thinnest part of

the abdominal wall. A toothed dissecting forceps picks up the fibrous sheath at this pint and the knife makes a small incision, carried down to the peritoneum. The lateral fibres of the rectus are just seen medially and the internal oblique ant the transverse muscle can now split laterally with the fingers both in the same line. The peritoneum is picked by two hemostats, one above and one below and incised in the line of the deep muscle split.[3]

TECHNIQUE OF APPENDECTOMY

After opening the peritoneum, the caecum nearly always presents. If there is free fluid a specimen is obtained for culture. In the event, the caecum does not offer its anterior wall into the wound, the terminal ileum is packed away under the medial edge of the incision and the caecum sought higher and more laterally.

The caecum is next grasped by the anterior taenia between finger and thumb and then drawn first downwards and inwards and then upwards over the medial portion of the wound.[4]

As it is delivered it is seized with a moist pack and progressively turned towards the left. The appendix comes into view. The right index finger may be inserted in to the wound to aid the gentle delivery of the organ, but only under vision. It is advisable to use the tissue holding forceps (Babcock's) to grasp the appendix. A more generally applicable maneuver is to seize the mesoappendix in a curved artery forceps.

The next step is to divide any bloodless peritoneal attachments to the right of the mesoappendix, allowing this structure to be more easily seen. The

mesoappendix may be serially clipped and cut until its base is reached or if the mesoappendix is well defined, a single ligature may be passed around it and tied.

The appendix is now free and unencumbered by instruments except for one forceps at its tip. A hemostat is applied across its base, then moved distally one diameter, applied again and finally applied for a third time the same distance along the appendix. The organ is ligated across the first crush and will be cut through the second.[5]

Residual appendiceal stump should be no longer than 3cm to minimize the possibility of stump appendicitis in the future. Much debate has gone for years about whether or not to invaginate the appendix stump.

Appendicular stump abscess in the caecal wall is so rare that it should not be regarded as a contraindication to invagination. In that the gut heals best by the formation of granulation tissue and collagen from serosal layers, it seems rational to invaginate.

Invagination is done using either purse string or Z-stitch suture placed at least 1.5 cm away from the stump. If the Caecal wall is edematous, one must not attempt invagination. The appendix base is cut with knife.

The tension on the caecum is now relaxed and the line of the mesoappendix checked for bleeding. If all is well the caecum is allowed to fall back into the wound. The following is carried out if the appendix is with doubt.[6]

I. In a female, palpate right ovary and tube. The glove is examined for blood.

II. The last meter of the ileum is withdrawn to

- See for mesenteric nodes.
- Meckel's Diverticulum
- Reasonably certain that there are no other lesions.

III. A finger is passed to the left and downwards to seek the inflamed loop of sigmoid colon which is a seat of diverticular disease.

PROBLEMS

1. The caecum cannot be found.
    - Either not descended fully or malrotation of the intestine.
    - Extension of the incision upward.
2. Caecum cannot be delivered.[7]
    - Adequate access and vision. The peritoneal reflection around the lower pole may be divided bearing in mind, that gonadal vessels and ureter lie medially just deep to the peritoneum.
3. Appendix cannot be found:
    - Make certain that it is the caecum that has been delivered.
    - Transverse colon recognized by attachment of greater omentum, Sigmoid colon by appendices epiploicae.

- Trace the taenia coli of the caecum, leads to the base of the appendix. Back or undersurface of the caecum palpated, the appendix may be buried in the caecal wall.[8]

- If previous appendectomy excluded, only possibility is organ has become inverted or intussuscepted.

4. Appendix has sloughed off:

    - The mesoappendix anchors the organ in the field of operation. It may be in portions if a faecolith has perforated through the wall. Both portions must be removed and the faecolith retrieved usually from the pelvis.[9]

5. The appendix lies buried Retrocaecally:

    - Enlarge the wound. Caecum is retracted to the left. Reflection of the peritoneum o the lateral aspect of the caecum is in view a hockey-stick shaped incision is made in the parietal peritoneum, after a little blunt dissection, in the retroperitoneal space the caecum can be retracted still further to the left rendered far more mobile and rotated, the combined effects of which result in bringing the greater portion of a hidden appendix.

6. Appendix clothed with adherent greater omentum.

    - Not to disturb the adherent omentum, when within it lies a gangrenous or perforated appendix.

    - Greater omentum divided between hemostats at a convenient distance from the appendix and then appendectomy conducted.

7. Appendix is gangrenous near its junction with caecum

    - Possibility of sudden gush of liquid faeces from the caecum , to avoid this, if the caecum is ballooned, deflated the caecum before appendectomy.

    - The method of closing the stump is, by two sutures transfixing the caecal wall. These must be inserted before the appendix is amputated and are later oversewn by interrupted seromuscular sutures.[10]

8. The mesoappendix is gangrenous and cuts out.

    - If a ligature will not hold, a stitch applied directly beneath a spurting vessel may stop the bleeding.

RETROGRADE APPENDECTOMY

Indication

- Base of the appendix is accessible and difficulty is experienced in identifying of delivering the distal part of the organ completely.

- In retrocaecal appendicitis.

Technique

- Base of appendix is held between finger and thumb so that its junction with caecal wall apparent.

- Fine hemostat passed between caecum and appendix to create a space and 2 similar instruments are applied across the appendix, which is divided between them.

- The mesoappendix is then clamped and divided working distally.
- Purse string suture is inserted with the hemostat grasps the stump.
- Appendicular stump ligated.
- Base of the appendix buried. [11]

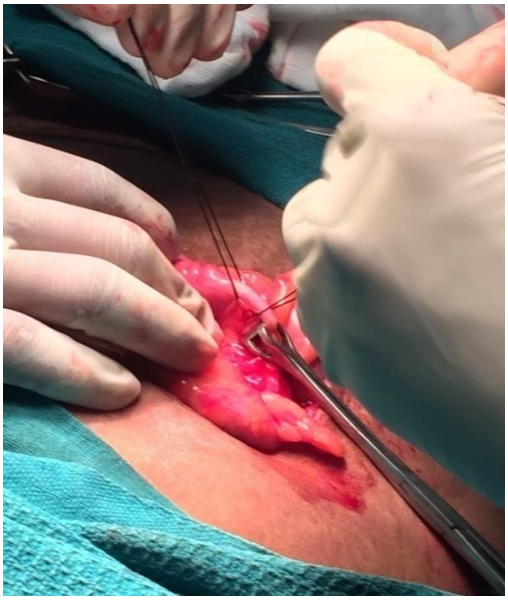
Closure

- There is no absolute need to close the peritoneum separately.
- Transverse slit in the peritoneum and deep muscle may be closed as one layer with either continuous or interrupted absorbable ’0’ gauge or nil gauge.
- A muscle cutting incision should be closed with continuous or interrupted absorbable monofilament sutures.
- Skin closed with fine, interrupted monofilament sutures or clips.[12]

MC BURNEYS INCISION

INTERNAL OBLIQUE MUSCLE CUT OPEN

BASE OF APPENDIX HOOKE OUT



RETROGRADE APPENDECTOMY

WOUND CLOSURE

Figure E

LAPAROSCOPIC APPENDECTOMY

The first description of laparoscopic appendectomy was in 1983 by semm in Germany.

PRINCIPLES AND JUSTIFICATION

Indication of laparoscopic appendectomy are same as open appendectomy.

Systemic review and Meta analysis of literature have revealed following

1. Less operating time in open appendectomy
2. Less post op pain and analgesic requirement in laparoscopic appendectomy[13]
3. Less wound complications in laparoscopic appendectomy
4. Less intra abdominal pus collection in open appendectomy
5. Open appendectomy is more economical[14]
6. Faster return to work in laparoscopic appendectomy

The only definitive indication of laparoscopic appendectomy is in young females of reproductive age group where diagnosis is in doubt and laparoscopy gives diagnostic advantages and avoids unnecessary laparotomy.[15]

Laparoscopic appendectomy is technically more challenging than open. It needs more training than open surgery. It has yet to be demonstrated that whether laparoscopic appendectomy will decrease the long term complications like pelvic adhesion and small bowel obstruction.[16]

CONTRAINDICATIONS

ABSOLUTE CONTRAINDICATIONS[17]

Generalized peritonitis

Advanced intestinal obstruction

Bleeding disorders

Portal hypertension

Lack of surgical experience

Inability to tolerate general anesthesia

Intra abdominal abscess[18]

RELATIVE CONTRAINDICATIONS

Previous abdominal surgery

Suspicion of malignancy

Advanced pregnancy[19]

Evidence of localized abscess formation

Severe co morbid illness[20]

ADVANTAGES OF LAPAROSCOPIC APPENDECTOMY

It allows more thorough exploration of the abdominal cavity. This is important in those patients presenting with evidence of lower abdominal peritonitis who appear to have a normal appendix.[21]

It allows definite treatment of other abdominal or pelvic pathology. Conversion to a midline laparotomy may be avoided if the entire abdomen examined laparoscopically.[22]

Finally, the incidence of post op wound complications is reduced. Contamination of the wound is assumed following removal of a inflamed or perforated appendix through a right lower quadrant or midline incision. During laparoscopic surgery the appendix can be removed without coming into direct contact with the fascia or subcutaneous tissue.[23]

DISADVANTAGES OF LAPAROSCOPIC APPENDECTOMY

The appendix stump may be difficult to mobilize and secure. With the availability of ENDO GIA stapler, base of the appendix can be easily tackled .[24]

The presence of extensive inflammation, dense adhesions, or abscess may necessitate abandoning the laparoscopic surgery in favor of an open approach.[25]

It needs general anesthesia but open surgery can be done under spinal or epidural anesthesia.[26]

EQUIPMENTS AND INSTRUMENTS OF LAPAROSCOPIC APPENDECTOMY

1. **Light Source**: A high intensity light source such as Xenon with variable intensity and a light filter provides adequate visualization of abdominal cavity at various distances. It can be equipped and a flash generator for film photography.[27]

2. **Fibre optic light guide cable** - A 5mm thick, 225cm long cable is desirable. A thick cable carries more light and a long cable is more convenient and less likely to be stretched.[28]

3. **Video camera** - To maximize the visualization of structure, single chip and viewing camera having 480 lines / inch resolution is the minimum requirement. It is attached to the scope and cable hooked to a processor that transmits the image to video monitor. The chip cameras (700 lines / inch resolution) are expensive, but provide the best image. All cameras require white balancing. [29]

4. **Telescope**– It is a based on the Hopkins rod lens system. It is available in many sizes, 10mm, 7mm, 5mm and the new 2mm. It may have forward views or 300/450 angled views. Telescope tips fog due to temperature differences outside and inside the patient. This is aggravated by the cold insufflations. Warming the telescope in warm water before use and touching the tip to the liver surface avoids fogging.[30]

5. **Endoflator (CO2 insufflator)** – It is used to insufflate carbon dioxide to create pneumoperitoneum. As a safeguard, it also monitors the IAP constantly to stop the flow once 12 to 16mm Hg of pressure is achieved and also has indicators for rate for flow and total volume of gas delivered. A rate of 4-5L/min delivery is ideal. But at least 6L/min is the minimum required. Carbon dioxide is the standard gas used for creation of pneumoperitoneum. It can be insufflated directly into the blood stream in volume up to 100L/min

without serious metabolic effect. It suppresses combustion and appears to be innocuous to the tissues of peritoneum.[31]

6. **High resolution video monitor** – 480 Hz lines /inch for one chip camera and 700 Hz lines / inch for three chip camera. Monitors should be at least 13 inch in size for adequate visibility and must be grounded. For teaching and documentation, printers and video recorders are invaluable.[32]

7. **Irrigation device** – A pressure of 300 mm Hg is usually used to irrigate the abdomen – either manual or powered. The irrigation / aspiration probes may have a single channel for both these functions or separate channels. Heparin 1000/UL may be added to the irrigation fluid to minimize clot formation.[33]

8. **Electro-cautery** – It is used to dissect mesoappendix from the appendix and achieve adequate haemostatsis. It uses electrons to produce heat and to dissect and coagulate tissues.[34]

Instruments:

It includes highly specialized and innovative device used to ensure safety of the procedure.[35]

1. **Veresss needle** – It is used to insufflate abdomen. A metal sheath covers the needle tip and retracts as the needle penetrates the abdominal wall and springs to over the tip once the needle is in the abdomen. It prevents the laceration of abdominal organs during insufflation. It is connected to the tubing from insufflator to establish pneumoperitoneum.

2. **Trocars and cannulas** – trocars for introduction of telescope and instruments are in two sizes ie. 11 mm and 5.5mm. The trocar consists for a metal tube with a sharp conical or pyramidal tipped obturator. The outer surface of the cannula has a dull finish to minimize reflection of light in the abdomen. Gas escape is prevented by a flap gate or trumpet valve. All trocars have stop cocks through which carbon dioxide can be insufflated or smoke evacuated.[36]

3. **Retractors / Graspers**-these are useful for grasping and retracting thick walled structures of extracting gall bladder from the abdomen. They are 5.5mm in diameter with jaws at the tip and handles with ratchets. They are inserted through two lateral cannulas and retract gall bladder and fundus.[37]

4. **Dissectors and scissors** - these are used for dissecting tubular structures, passing ligatures and pin point diathermy. They have thin elongated jaws. Maryland dissector has jaws bent at the tip. Hook scissors can cut and grasp tissues with tip and pull them out. Straight scissors or micro scissors are used for division for cystic duct and cholangio-catheter placement.[38]

5. **Occlusion applicators** – These come in 3 sizes – medium, medium large and large. These are used to clip cystic artery and cystic duct.[39]

6. **Coagulators** – These are used to cut or coagulate. Hook or spatula is used for dissection or coagulation.

PRE OP PREPARATION

The patient should be adequately hydrated with intravenous fluids

Before 30 minutes of the surgery the second generation cephalosporin antibiotics should be given. To decompress the stomach a nasogastric tube should be put. To decompress the urinary bladder, a Foley catheter is needed .[40]

LAPAROSCOPIC OPERATIVE SETUP

TROCARS AND CANNULAS

LAPAROSCOPIC HAND INSTRUMENTS

Figures F

LAPAROSCOPIC APPENDECTOMY TECHNIQUE

After induction of general anesthesia the patient is supine positioned on the theatre table with the left arm tucked at the side. Antibiotics are routinely started at the time of diagnosis of acute appendicitis and are not duplicated in the operating room unless otherwise needed based on the time interval since the last dose.

A Foley catheter is placed under the sterile conditions for decompression of the bladder. Deep venous thrombosis prophylaxis is by sequential compression devices. On the right side of the patient a monitor is placed. On the left side of the patient, the Surgeon and first assistant both stand.

Pneumoperitoneum is created with the closed technique using a Veress needle or the open Hasson cannula technique. Closed technique is preferred in all except in patients with perforation peritonitis or with distended bowel loops.

The umbilicus is the preferred site for insertion of the Veress needle . An alterative site may be chosen or an open insertion technique may be used. Alternative sites for the insertion of Veress needle include the right or the left midsubcostal regions, right and the left iliac fossae and the supraumbilical region along the linea alba.

The needle (and subsequent trocar) should be inserted at 45° angle towards the pelvis and away from the aorta and inferior vena cava. One frequently appreciates a click of a spring loaded Veress needle as it enters through the fascia.

Confirmation of the intraperitoneal location of Veress needle is done by:

a. Needle is aspirated to demonstrate the absence of return of blood or bowel Contents or a free flow of fluid.

b. Saline drop test: the needle is filled with saline and fluid is demonstrated to Flow freely by gravity into the peritoneal cavity as negative pressure is generated by lifting the abdominal wall.

There are several methods of gaining safe access to the peritoneal cavity including the open Hassan technique, use of the Veress needle, and use of an optical view trocar under laparoscopic visualization, among others.

A 10-mm port is inserted, secured, and pneumoperitoneum with carbon dioxide established. Visualization is obtained for the duration of the operation using an angled 1o-mm laparoscope.

The patient is then placed in Trendelenburg and left lateral decubitus position.

Two additional ports, usually of 5-mm diameter are inserted in the right lumbar position and the left lower position ,in the abdomen.

Avoid injury to the bladder and the epigastric vessels as well as other underlying visceral organs .care must be taken

This port arrangement allows for adequate visualization and comfortable ergonomics while maintaining excellent cosmesis.

A thorough inspection of the entire peritoneal cavity is performed first, and then the operation begins by mobilizing a small bowel loops out of the RLQ, thereby exposing the caecum and terminal ileum.

The base of the appendix can be readily found by following the tenia coli on the ascending colon proximally to the confluence of the caecal tenia.

The base of the appendix can also be found by following the fat pad located between the terminal ileum and the base.

Once identified, the appendix is gently manipulated to bring it into view. Oftentimes, this required some blunt dissection away from surrounding visceral organs where inflammatory adhesions have formed.

With a retrocaecal appendix, some mobilization of the caecum using Sharp dissection off the retroperitoneum, Is needed for adequate visualization.

Once the appendix is dissected free and elevated, the mesoappendix containing The appendiceal artery becomes readily apparent ,blunt dissection is performed to made the window between the appendix and the mesoappendix .'

The appendix is then divided at its base using extracorporeal suturing. Care must be taken to divide as close to the base as possible.

If the base of the appendix is acutely inflamed, dilated, or perforated, Then the stapler must be placed such that a cuff of the normal caecum is removed as well.

Alternatively, the appendix can be divided with scissors after suture ligature using an endoloop.

Next the mesoappendix is divided using the linear stapler .

A cartridge with 2.5-mm staple height is used to ensure hemostasis.

In some cases, multiple cartridges are required to completely divide the mesoappendix. Alternatively, isolation of the appendiceal artery and ligation with clips or use of an energy device such as an ultrasonic dissector or bipolar cautery can be performed. The appendiceal stump and mesoappendix are then irrigated and carefully inspected for leak or hemorrhage.

The appendix is placed into a bag and removed through the umbilical port site.

It is important to examine the specimen on the back table to be certain that the appendix, And not merely an inflamed mesoappendix, has been removed.

Any areas of contamination are thoroughly irrigated.

This is critical for preventing postoperative abscess formation and should not be skipped or rushed.

The port sites are then inspected, the pneumoperitoneum is evacuated, and the ports are removed The absorbable suture is used for the closing fascial defect at the umbilical port site.

Subcuticular absorbable suture used to close the skin.

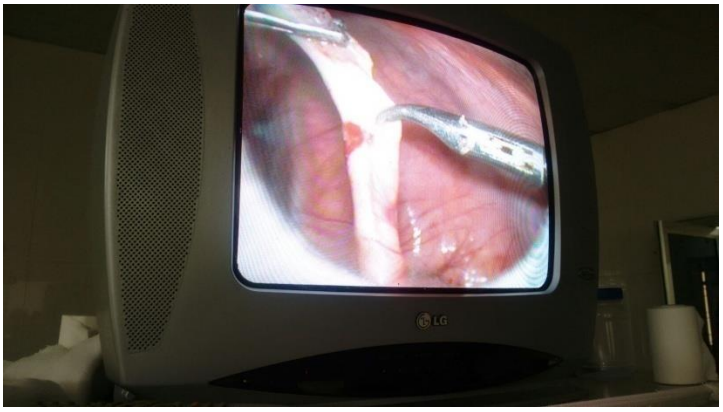
PORT POSITIONS

SUPRA UMBLICAL

RIGHT SUBCOSTAL

LEFT ILIAC FOSSA

APPENDIX GRASPED WITH ATRAUMATIC GRASPER



DIVISION OF MESOAPPENDIX

EXCISION OF APPENDIX

Figures G

Single-Incision Technique

Several successful single-incision techniques for laparoscopic appendectomy have now been reported.

The earliest approaches involved identification of the appendix using a laparoscope placed over the appendix, grasping the appendix through a working channel in the scope, then externalizing it and performing an appendectomy using the open technique.

More recent techniques involve multiple ports placed through a single incision in the periumbilical or usage of a multichannel port device. Single-incision technique for appendectomy has been shown in multiple small Retrospective studies to be safe and effective in certain patient populations, although placement of additional ports is often necessary to complete the operation.

Proposed benefits of single-incision technique over the conventional laparoscopy had yet to be validated by the prospective randomized trial.

POST OPERATIVE COMPLICATIONS

INTRA PERITONEAL COMPLICATIONS

EARLY

Appendix stump blow out – spillage of colonic contents into the peritoneal cavity Generalized peritonitis- perforated or gangrenous appendix, virulent organisms and late presentations Abscess- local, pelvic, subhepatic, subphrenic. Retained faecolith causing chronic local infection. Hematoma due to slippage of ligature, mesenteric or omental tear.

EARLY OR LATE (EVEN MANY YEARS LATER) COMPLICATIONS

Intestinal obstruction due to adhesions

LATE COMPLICATIONS

Infertility due to tubal occlusion following pelvic infection.

INTRA ABDOMINAL COMPLICATIONS

EARLY

Superficial and deep wound infection. Dehiscence

LATE

Incisional hernia

COMPLICATIONS AFTER APPENDECTOMY

Paralytic ileus, Reactionary hemorrhage, Portal pyaemia, Right inguinal hernia due to injury to ilio inguinal nerve, Faecal fistula Respiratory problems, Deep vein thrombosis.

INCIDENTAL APPENDECTOMY

Here removal of appendix is done at laparotomy for other conditions. It is done in vague abdominal pain of doubtful severity. It is a useful procedure to tackle MUNCHAUSEN SYNDROME (psychological benefit). It is done for malrotation (ladd procedure). It is also done during on table colonic lavage (DOODLEYS LAVAGE).

METHODOLOGY

SOURCE OF THE DATA

The study design consists of the patients admitted in the surgical wards of government chengalpattu medical college with acute appendicitis from July 2014 to august 2015.

METHOD OF COLLECTION OF DATA

This prospective study from july2014 until august 2015 involved 60 Cases that were consecutively selected, where the investigator was a part of the Surgical team managing the patients, by using random sampling technique.

INCLUSION CRITERIA

Patients presenting with acute appendicitis.

EXCLUSION CRITERIA

Patients with delayed presentation leading to appendicular mass, abscess.

Patients who do not consent for the study.

Patients less than 12 years of age.

In spinal or general anesthesia Open appendectomy was performed, through the muscle splitting incision in the right iliac fossa. The base of the appendix was crushed and ligated and the stump of the appendix was not invaginated

In general anesthesia, Laparoscopic technique performed using the Standardized approach involving the closed technique for the trocar insertion and by 3- port technique. The appendix is divided after double ligation of the base. Extraction of the appendix was performed using trocar sleeve to protect the wound from Contamination during removal.

All cases were followed in the postoperative period till they were discharged and then later followed for a period of 4 weeks in the outpatient department.

The following parameters were observed between the two procedures.

1. Duration of procedure
2. Postoperative pain graded from 0 to 4.(visual analogue scale)
3. Cosmetic benefit
4. Postoperative complications like nausea/vomiting , fever and wound infection.
5. Post operative length of hospital stay in number of days was noted.
6. Return to the work in number of days

A proforma was used to collect the relevant information. Data was analyzed Using the Students t-test and Chi-square analysis and P value of <0.05 is considered Significant.

OBSERVATIONS AND RESULTS

30 Patients of laparoscopic appendectomy and 30 patients of open appendectomy are analyzed and results are as follows,

SEX DISTRIBUTION

TABLE: 1

SEX	Laparoscopy		Open		Chi Sq Test	P value
	N	%	N	%		
Male	11	36.7	19	63.3	4.26	**0.04**
Female	19	63.3	11	36.7		
Total	30	100	30	100		

AGE DISTRIBUTION

TABLE: 2

AGE	Laparoscopy		open		Chi Sq Test	P value
	N	%	N	%		
<20	10	33.3	7	23.3	3.89	0.27
21-30	9	30	12	40		
31-40	7	23.3	3	10		
41-50	4	13.3	8	26.7		
Total	30	100	30	100		

In the study, 11 (36.7%) males and 19 (63.3%) females underwent laparoscopic appendectomy. 19 (63.3%) males and 11 (36.7%) females underwent open appendectomy. The mean age for undergoing laparoscopic appendectomy was 28.67 years and open appendectomy was 29.73 years.

CHART: 1 SEX DISTRIBUTION

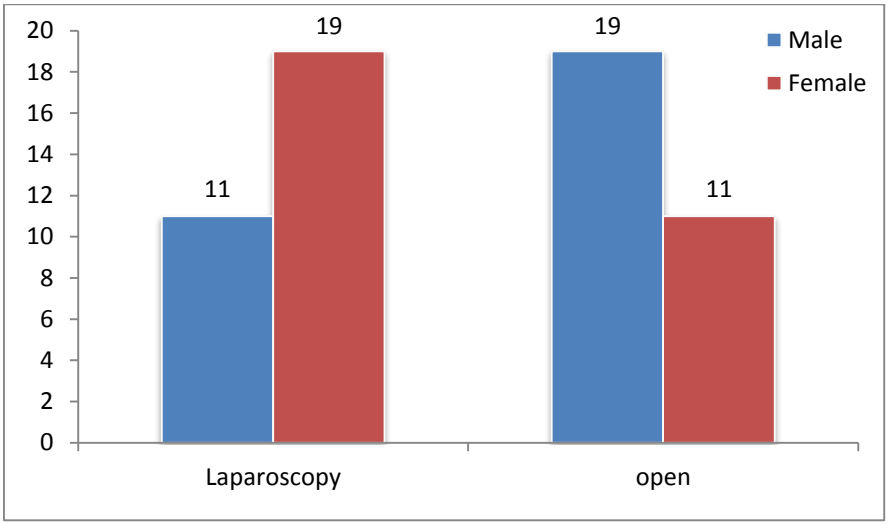
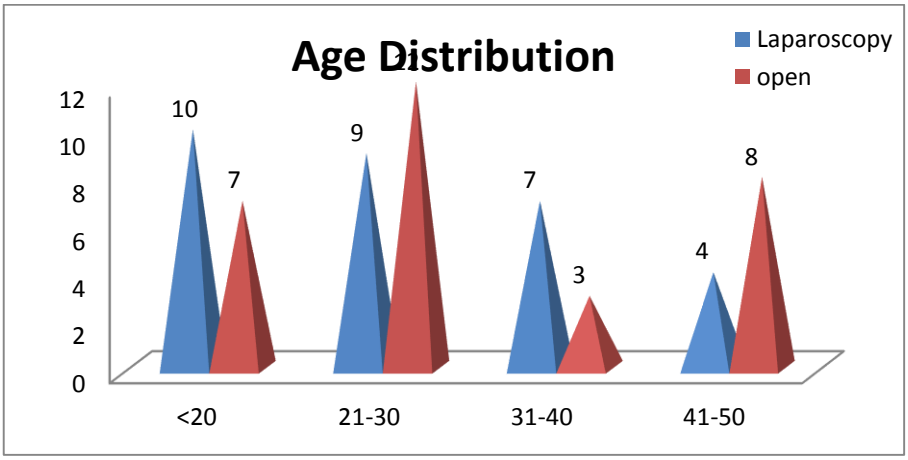


CHART: 2 AGE DISTRIBUTION



PRESENTING COMPLAINTS

TABLE: 3 NAUSEA AND VOMITING

N/V	Laparoscopy		Open		Chi Sq Test	P value
	N	%	N	%		
Absent	12	40	10	33.3	0.28	0.5
Present	18	60	20	66.7		
Total	30	100	30	100		

TABLE: 4 FEVER

Fever	Laparoscopy		Open		Chi Sq Test	P value
	N	%	N	%		
Absent	17	56.7	18	60	0.069	0.7
Present	13	43.3	12	40		
Total	30	100	30	100		

In the study, 18 (60%) patients had nausea and vomiting in laparoscopic appendectomy.20 (66.7%) patients had nausea and vomiting in open group. 13(43.3%) patients had fever in laparoscopic group, 12(40%) had fever in open group.

In both groups almost all had RIF pain in both groups.

CHART: 3 NAUSEA AND VOMITING

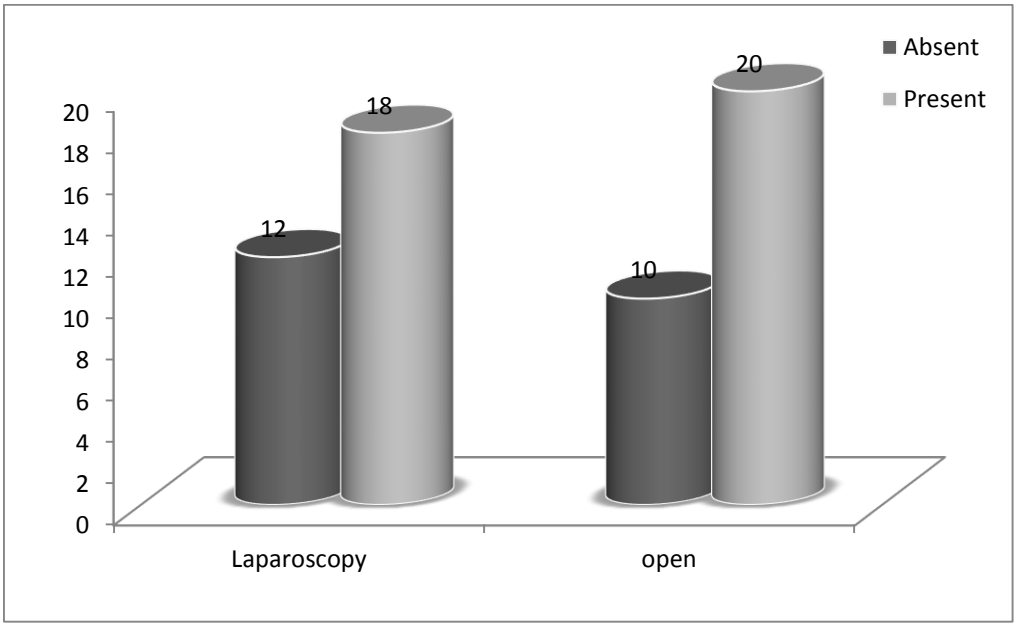


CHART 4: FEVER

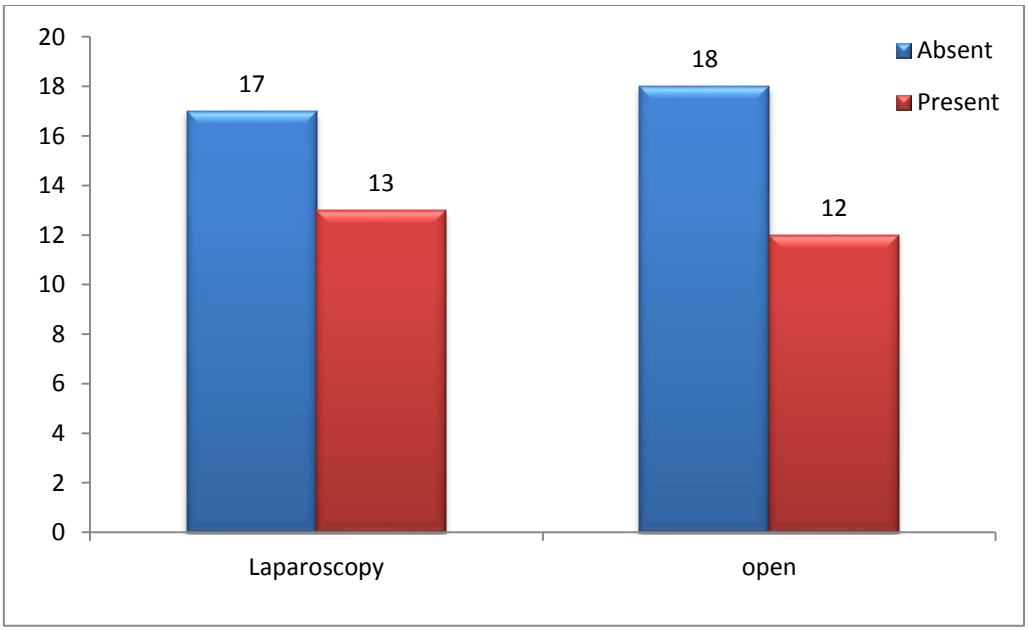
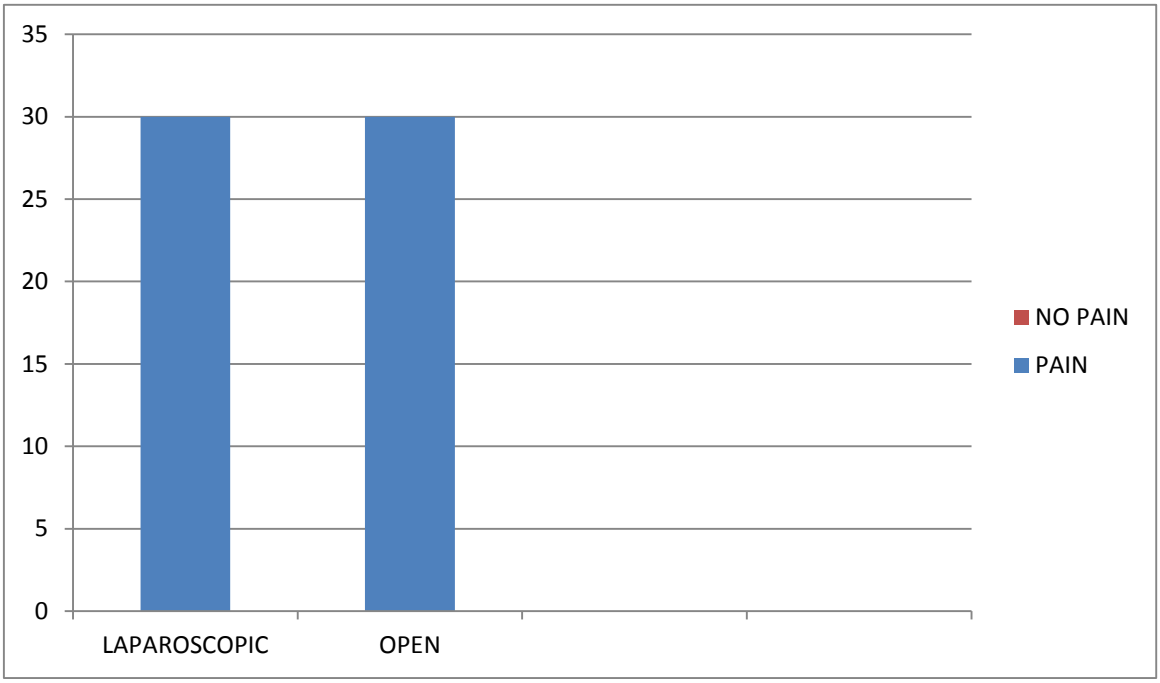


CHART: 5 RIF PAIN

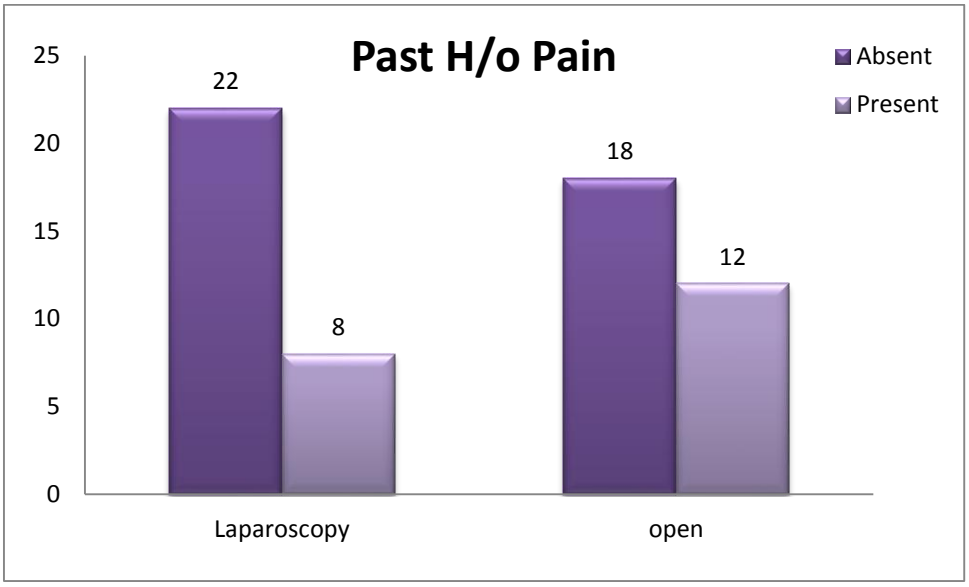


PAST H/O PAIN

TABLE: 5 PAST H/O PAIN

PAST H/O PAIN	Laparoscopy		open		Chi Sq Test	P value
	N	%	N	%		
Absent	22	73.3	18	60	1.2	0.2
Present	8	26.7	12	40		
Total	30	100	30	100		

CHART : 6 PAST H/O PAIN



In the study, 8 (26.7%) patients in the laparoscopic group and 12(40%) patients in the open group had past h/o pain.

LOCAL EXAMINATION

TABLE: 6 GUARDING

GUARDING	Laparoscopy		open		Chi Sq Test	P value
	N	%	N	%		
Absent	21	70	11	36.7	6.69	**0.01**
Present	9	30	19	63.3		
Total	30	100	30	100		

CHART 7 GUARDING

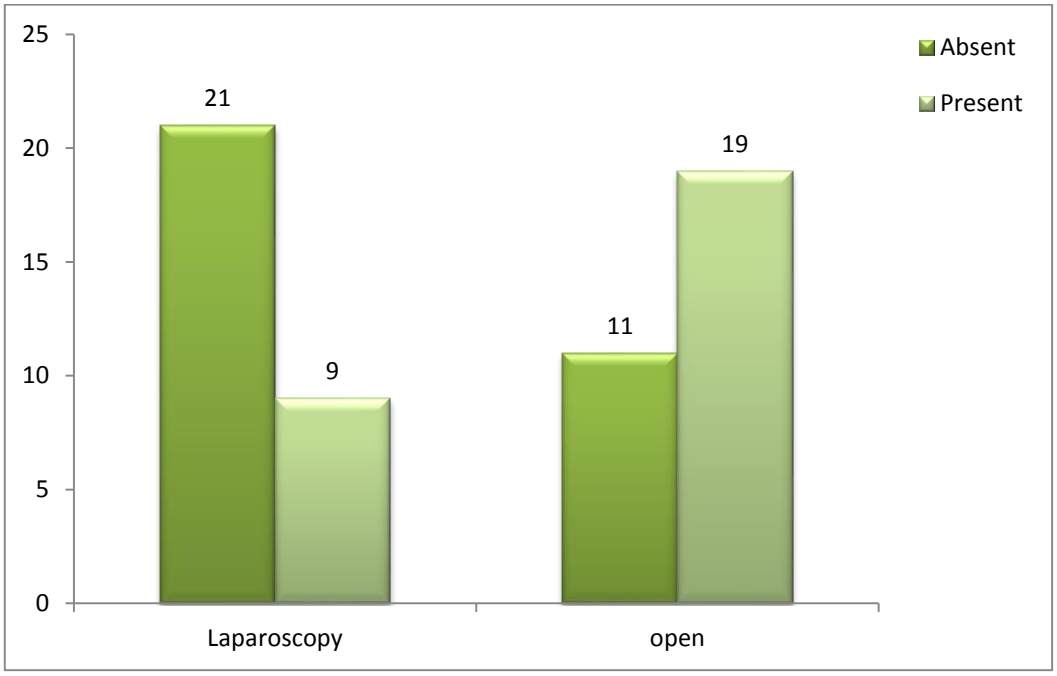
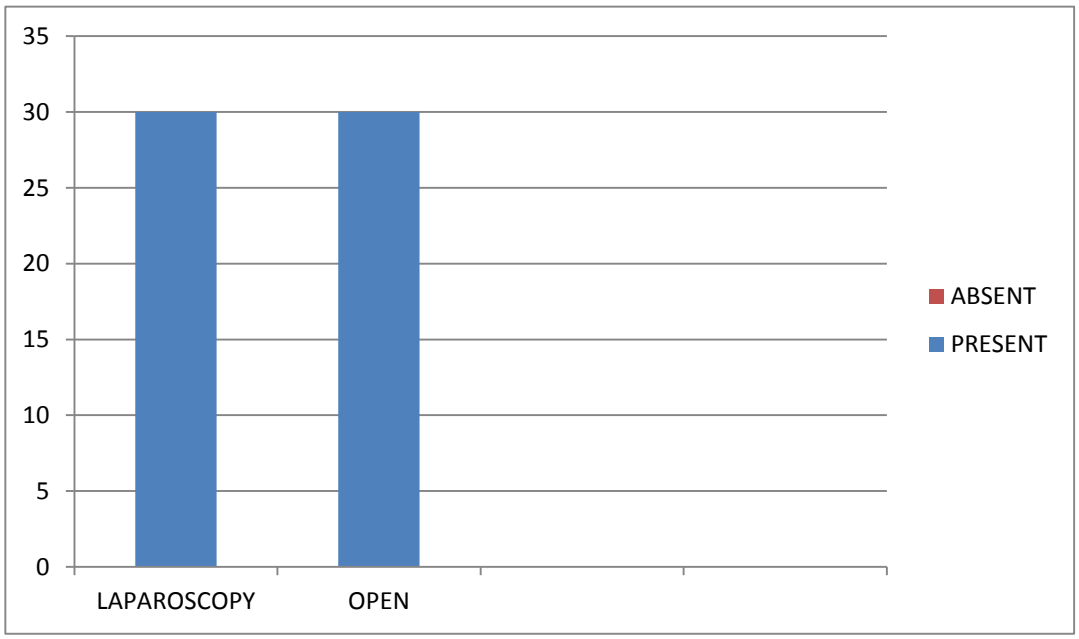


CHART: 8 PER ABDOMEN TENDERNESS



In the study, all patients had tenderness in both groups. 9 (30%) patients in laparoscopic group and 19 (63.3%) patients in open group had guarding on local examination.

LABORATORY PARA METERS.

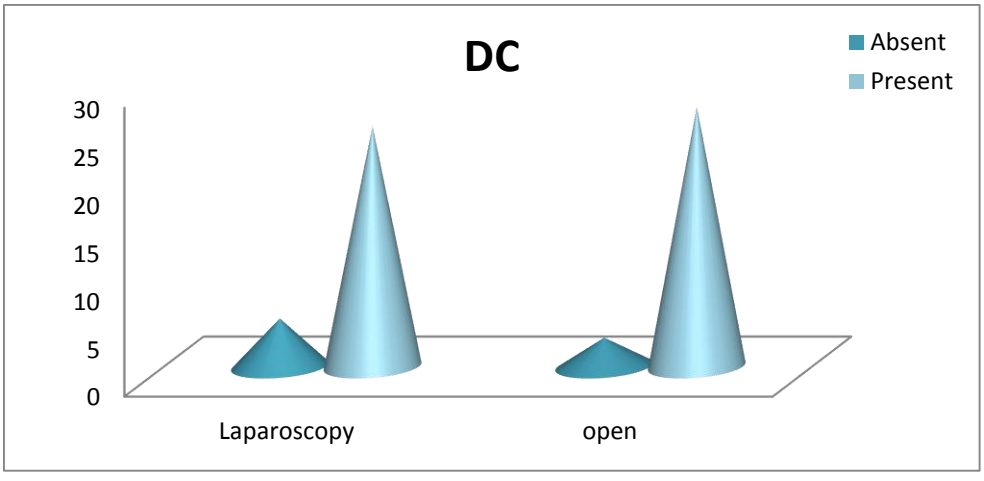
TABLE: 7 DIFFERENTIAL COUNT WITH SHIFT TO LEFT

DC	Laparoscopy		open		Chi Sq Test	P value
	N	%	N	%		
Absent	5	16.7	3	10	0.57	0.4
Present	25	83.3	27	90		
Total	30	100	30	100		

TABLE: 8 TABLE TOTAL COUNT

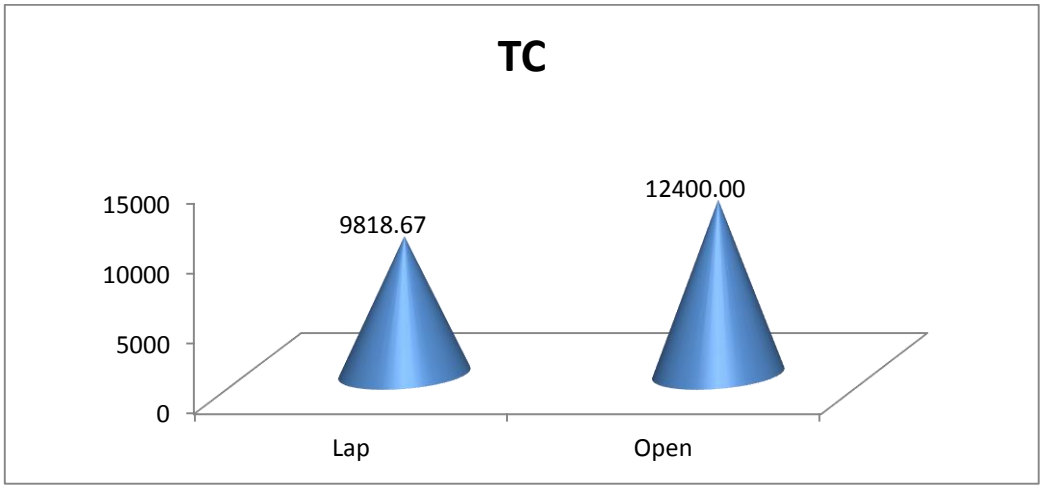
	Type of Surgery	N	Mean	Std. Deviation	Std. Error Mean	t	P
TC	Lap	30	9818.67	3057.721	558.261	2.955	**0.005**
	Open	30	12400.00	3632.554	663.211		

CHART: 9 DIFFERENTIAL COUNT WITH SHIFT TO LEFT



In the study, 25(83.3%) patients in the laparoscopic group and 27(90%) patients in the open group had differential count with shift to left.

CHART: 10 TOTAL COUNT



The mean total count in laparoscopic group were 9819 and mean total count in open group were 12400.

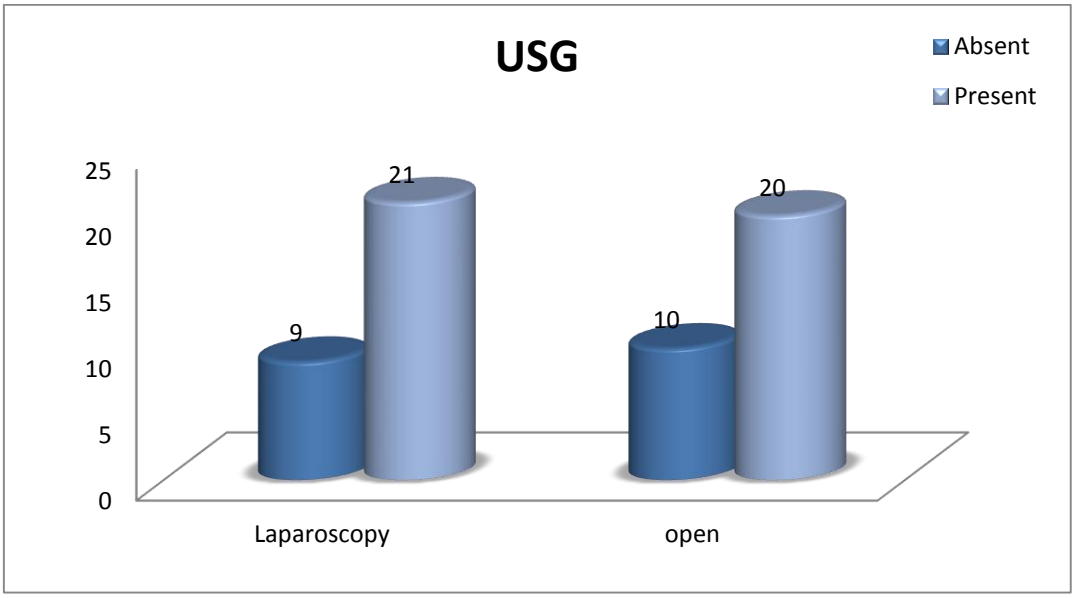
ULTRA SOUND FINDINGS

TABLE: 9 ULTRA SOUND FINDINGS

USG	Laparoscopy		open		Chi Sq Test	P value
	N	%	N	%		
Absent	9	30	10	33.3	0.08	0.7
Present	21	70	20	66.7		
Total	30	100	30	100		

In the study, 21(70%) patients in laparoscopic and 20 (66.7%) patients in open group had inflamed appendix in USG.

CHART: 11 ULTRASOUND FINDINGS

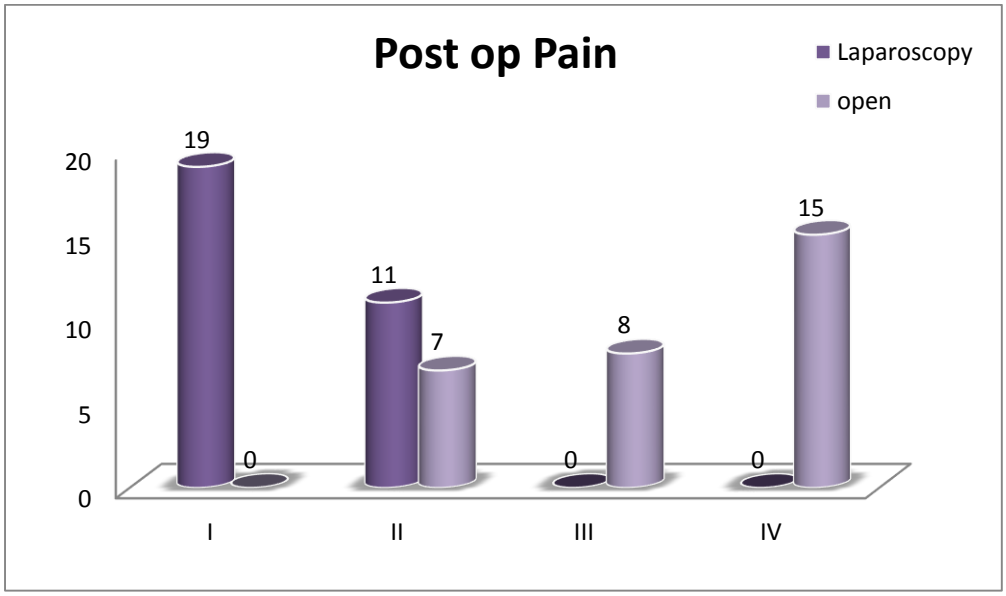


POST OPERATIVE PAIN

TABLE: 10 POST OPERATIVE PAIN

Post op Pain	Laparoscopy		open		Chi Sq Test	P value
	N	%	N	%		
I	19	63.3	0	0	42.8	**0.0001**
II	11	36.7	7	23.3		
III	0	0	8	26.7		
IV	0	0	15	50		
Total	30	100	30	100		

CHART: 12 POST OP PAIN



In the study, the mean pain score was 1.31±0.49 in the laparoscopic group. The mean pain score in the open group is 3.27± 0.828. The difference is significant ($p<0.0001$).

POST OPERATIVE COMPLICATIONS

VOMITING

TABLE: 11 VOMITING

Vomit	Laparoscopy		open		Chi Sq Test	P value
	N	%	N	%		
Absent	24	80	14	46.7	7.18	**0.007**
Present	6	20	16	53.3		
Total	30	100	30	100		

TABLE: 12 WOUND INFECTION

Wound Infection	Laparoscopy		open		Chi Sq Test	P value
	N	%	N	%		
Absent	29	96.7	22	73.3	6.41	**0.01**
Present	1	3.3	8	26.7		
Total	30	100	30	100		

TABLE: 13 FEVER

Fever	Laparoscopy		open		Chi Sq Test	P value
	N	%	N	%		
Absent	26	86.7	22	73.3	1.67	0.1
Present	4	13.3	8	26.7		
Total	30	100	30	100		

CHART: 13 POST OP VOMITING

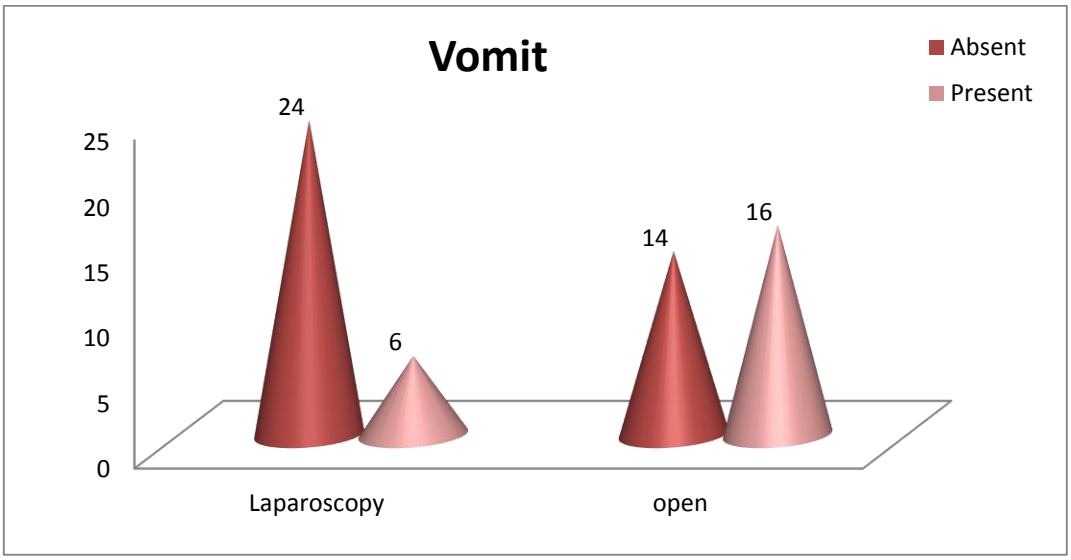


CHART: 14 WOUND INFECTION

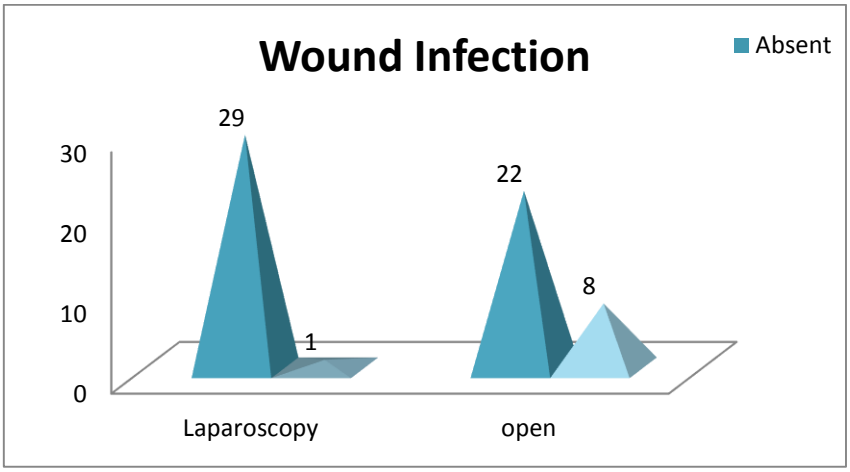
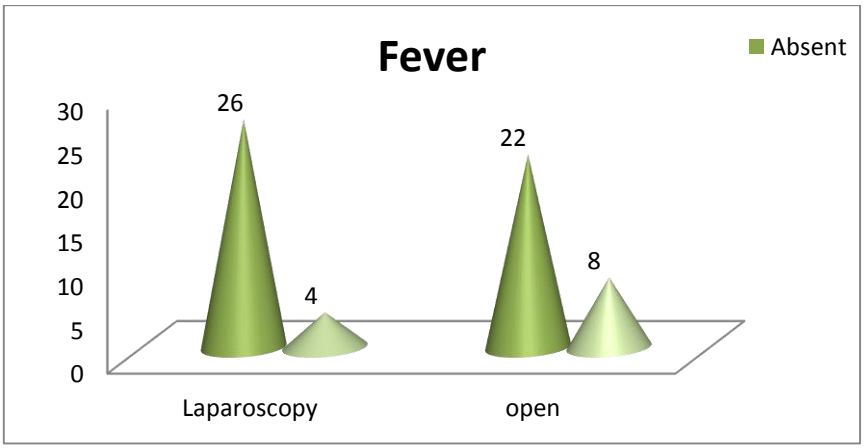


CHART: 15 POST OP FEVER



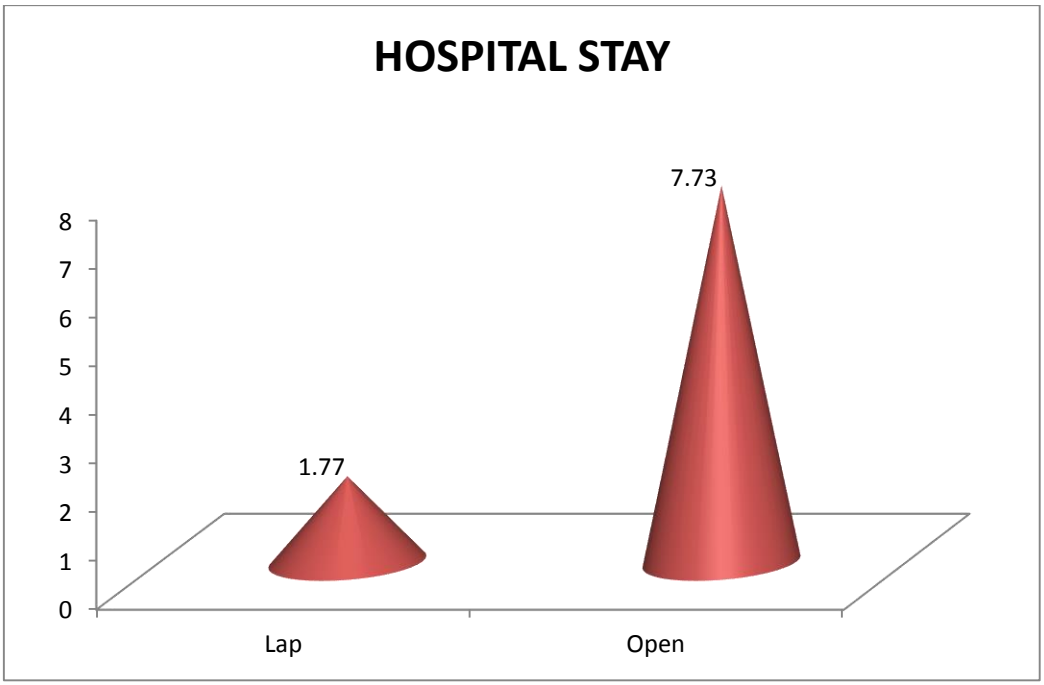
In the study, 6 patients in the laparoscopic group (20%) and 16 patients in the open group (53.3%) have post op vomiting. The difference was significant ($p<0.007$). 8 patients in the open group(26.7%) and 1 patients in the laparoscopic group(3.3%) have post op wound infection. The difference was significant ($p<0.01$). 8 patients in the open group (26.7%) and 4patients in the Laparoscopic group (13.3%) have post op fever.

HOSPITAL STAY

TABLE : 14 HOSPITAL STAY

	TYPE OF SURGERY	N	Mean	Std. Deviation	Std. Error Mean	T	p
STAY	Lap	30	1.77	0.728	0.133	21.15	**0.0001**
	Open	30	7.73	1.363	0.249		

CHART: 16 HOSPITAL STAY



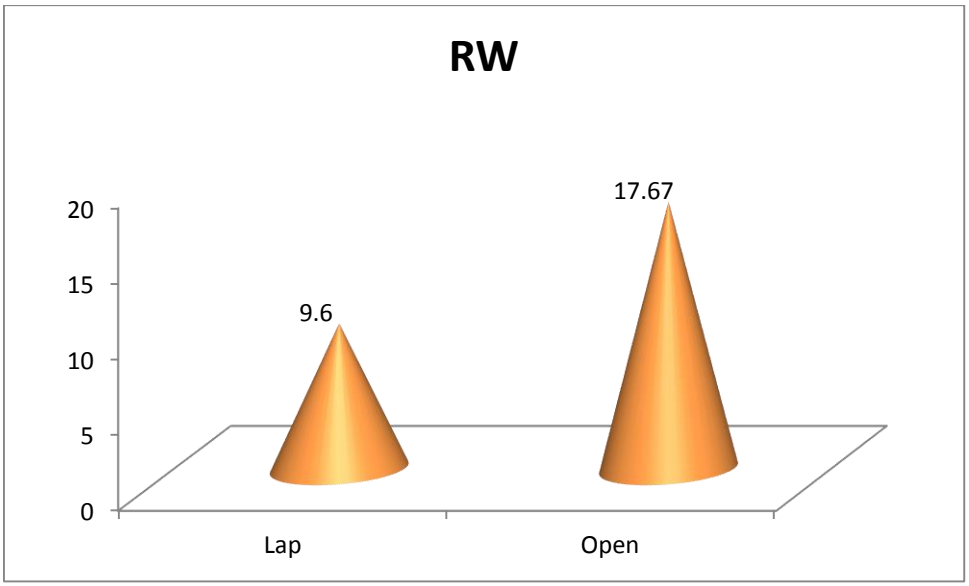
The mean hospital stay score was 1.77 days in the laparoscopic group and 7.73 days in the open group .The parameter difference is significant ($p<0.0001$)

RETURN TO THE WORK OR PHYSICAL ACTIVITY

TABLE: 15 RETURN TO THE WORK

	TYPE OF SURGERY	N	Mean	Std. Deviation	Std. Error Mean	T	p
RW	Lap	30	9.6	3.081	0.562	10.298	**0.0001**
	Open	30	17.67	2.987	0.545		

CHART: 17 RETURN TO THE WORK



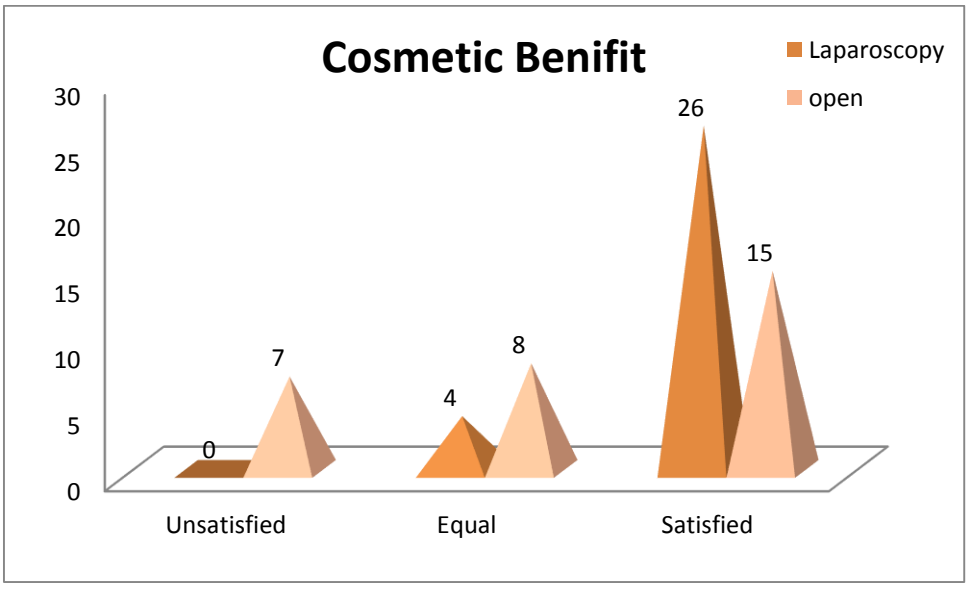
The mean score return to work was 9.6 days in laparoscopic and 17.67 days in open group. The difference was significant ($p<0.0001$)

COSMETIC BENEFIT

TABLE: 16 COSMETIC BENEFIT

COSMETIC BENIFIT	Laparoscopy		open		Chi Sq Test	P value
	N	%	N	%		
Unsatisfied	0	0	7	23.3	11.29	**0.004**
Equal	4	13.3	8	26.7		
Satisfied	26	86.7	15	50		
Total	30	100	30	100		

CHART: 18 COSMETIC BENEFIT



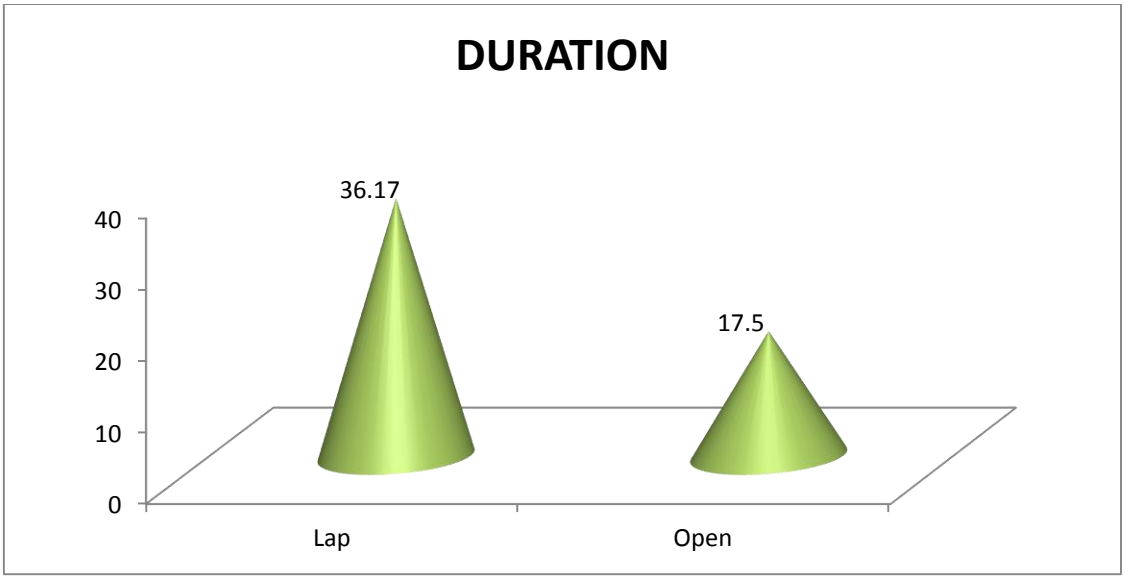
In the study, cosmetic benefit difference found to be significant (0.004).

DURATION OFTIME OF SURGERY

TABLE: 16 DURATION OF TIME OF SURGERY

	TYPE OF SURGERY	N	Mean	Std. Deviation	Std. Error Mean	t	P
Duration	Lap	30	36.17	12.225	2.232	7.693	**0.0001**
	Open	30	17.5	5.211	0.951		

CHART: 19 DURATION OF TIME OF SURGERY



The mean score for duration of time of surgery was 36.17 minutes in the laparoscopic group and 17.5 minutes in the open group. The difference was significant ($p<0.0001$)

DISCUSSION

The gold standard treatment for acute appendicitis is appendectomy. Though open appendectomy remains gold standard, nowadays laparoscopic appendectomy has gained a lot of importance now. However the role of laparoscopy in appendectomy, commonest indications remains controversial. Several studies have been conducted around the world, some have supported and favored laparoscopy and some others are not.

Most cases of acute appendicitis can be treated by laparoscopy. Laparoscopic appendectomy is equally safe and less post op pain and morbidity as compared to open appendectomy. Laparoscopic appendectomy is a useful procedure for reducing the hospital stay, return to work early, less complications encountered. With better training now in minimal access surgery now, laparoscopy has been popular now.

Laparoscopic procedures decrease the loss of earning days by an early return to work and shorter hospital stay. Hence it's useful in India where most of them are daily wages workers. Hence laparoscopic appendectomy may replace open appendectomy in the near future in both elective and emergency conditions.

POST OP PAIN SCORE

Post operative pain score was assessed at the end of 24 hours of surgery using the visual analogue scale.

The score was graded as

1 – Pain is absent

2 - Pain is mild

3 – Pain is moderate

4- Pain is severe

The pain was recorded by the patient perception.

In our study, the mean post op pain score was recorded at the end of 24 hours for laparoscopic appendectomy is 1.37±0.49 and for open appendectomy is 3.27±0.828. The parameter difference is significant $p<0.0001$. The long incision in open appendectomy and stretch of muscles during open procedure leads to this difference. Similar other studies like swenny kj et al and Ortega ae et al was supported in favor in laparoscopic in terms of post op pain score. Mean post op pain score of laparoscopic is 2.25 and for open is 3.01 in swenny kj et al study. Mean post op pain score of laparoscopic is 2.01 and for open is 3.25 in Ortega ae et al study.

POST OPERATIVE COMPLICATIONS

VOMITING

In the study, 6 patients in the laparoscopic group (20%)and 16 patients in the open group(53.3%) have post op vomiting. The parameter difference was significant ($p<0.007$).

FEVER

In the study, 8 patients in the open group (26.7%) and 4 patients in the laparoscopic group (13.3%) have post op fever

WOUND INFECTION

In the study, 8 patients in the open group (26.7%) and 1 patients in the laparoscopic group (3.3%) had post op wound infection. The difference was significant ($p<0.01$). The study shows that post operative complications like fever, vomiting, wound infection was higher in open group compared to laparoscopic group. Several studies like Ortega ae et al , geeta kr at al was supported in favor of laparoscopic group in terms of wound infection

Number of cases had post op wound infection in Ortega ae et al study for open group was 11 and laparoscopic group was 4. Number of cases had post op wound infection in geeta kr et al study for open group was 11 and laparoscopic group was 0 .

HOSPITAL STAY

In the study, the mean hospital stay score was 1.77 ± 0.728 days in the laparoscopic group and 7.73 ± 1.363 days in the open group. The difference was significant ($p<0.0001$). The study shows that mean hospital stay was lower in the laparoscopic group which is very important in developing countries where most of them are daily wages. Several studies like Attwood se et al, Young je et al , geeta kr et al , wei hb hung et al are in favor for laparoscopic group in terms of hospital stay.

The mean hospital stay score was 3.31 days in the laparoscopic group and 4.36 days in the open group in geeta kr et al study. The mean hospital stay score was 3 days in the laparoscopic and 4 days in the open group in Young je et al study. The mean hospital stay score was 2.5 days in the laparoscopic group and 3.8 days in the open group in Attwood se et al study. The mean hospital stay score was 4.1 days in the laparoscopic group and 7.2 days in the open group in Wei hb hung et al study.

RETURN TO WORK

In the study, the mean score return to work was 9.6 days in the laparoscopic and 17.67 days in the open group. The parameter was significant $p<0.0001$. The study show that's return to work was quicker in laparoscopic group compared to open group. Several studies like Ortega ae et al , geeta kr et al studies are in favor in laparoscopic group in terms of return to work category The mean score for return to work was 9 days in the laparoscopic group and 14 days inthe open group in Ortega ae et al study. The mean score for return to work was 13.86 days in the laparoscopic group and 19.44 days in the open group in geeta kr et al study. The mean score for return to work was 9.1 days in the laparoscopic group and 13.7 days in the open group in Wei hb hung et al study.

COSMETIC BENEFIT

Cosmetic benefit was recorded by patient own perception
It has been graded into 3 grades
Grade 1: unsatisfied
Grade 2: equivocal
Grade 3: satisfied.

The cosmetic benefit was patient perception in terms of scar.

In the laparoscopic group, 26 (86.7%) patients were satisfied with cosmetic benefit, 4 (13.3%) patients were equivocally satisfied, 0 patients were unsatisfied.

In the open group,15(50%) patients were satisfied , 8 (26.7%) were equivocally satisfied, 7 (23.3%) patients were un satisfied with cosmetic benefit. The study show that laparoscopic group had better cosmetic results

Sucullu l et al in 2009 study shows that no difference in cosmetic benefit outcome between the 2 groups. The main advantage of laparoscopy is umbilical scar was hidden by natural camouflages. LIF AND RIGHT LUMBAR scar is hardly visible which depends on port placement.

DURATION OF TIME OF SURGERY

In the study, The mean score for duration of time of surgery was 36.17±12.25 minutes in laparoscopic group and 17.5 ±5.211 minutes in the open group. The parameter difference was significant $p< 0.0001$. The study show that duration of time of surgery was higher in the laparoscopic group compared to the open group. Several studies like Ortega ae et al, geeta kr et al are in favor of open group in terms of duration of time of surgery. The mean duration of time of surgery was 68 minutes in the laparoscopic group and 58 minutes in the open group in Ortega ae et al study design. The mean duration of time of surgery was 74.13 minutes in the laparoscopic group and 58.2 minutes in the open group in geeta kr et al study design. The mean duration of time of surgery was 91minutes in the laparoscopic group and 82minutes in the open group in hekkim tj et al study design. In our study, there was no conversation rate from laparoscopic to open procedure

SUMMARY

This study was done from JULY 2014 to AUGUST 2015 on 60 patients with clinical diagnosis of acute appendicitis admitted in surgical wards of government chengalpattu Medical College, Chengalpattu . The patients were selected by random sampling technique.

All the patients were followed every day in post operative period till they were discharged and then later followed for a period of 4 weeks in and out patients department.

The following parameters like post operative pain, post operative complications, duration of the hospital stay, return to the work, cosmetic benefit, duration of the time of the surgery between the open and laparoscopic appendectomy.

After analyzing the data using chi- square test and student's t test we noticed That, there is significant difference between the two procedures with laparoscopic Appendectomy being better in respect to all the terms.

In the study, the mean post op pain score was recorded at the end of 24 hours for laparoscopic appendectomy is 1.37±0.49 and for open appendectomy is 3.27±0.828. The parameter difference is significant $p<0.0001$.

In the study, 6 patients in laparoscopic group (20%) and 16 patients in open group (53.3%) have post op vomiting. The difference was significant ($p<0.007$).

In the study, 8 patients in open group (26.7%) and 4 patients in laparoscopic group (13.3%) have post op fever

In the study, 8 patients in open group (26.7%) and 1 patients in laparoscopic group(3.3%) have post op wound infection. The difference was significant ($p<0.01$)

In the study, The mean hospital stay score was 1.77 ±0.728 days in the laparoscopic group and 7.73 ±1.363 days in the open group. The difference was significant ($p<0.0001$)

In the study, the mean score return to work was 9.6 days in laparoscopic and 17.67 days in the open group. The parameter difference was significant $p<0.0001$ In the laparoscopic group, 26 (86.7%) patients were satisfied with cosmetic benefit, 4 (13.3%) patients were equivocally satisfied , 0 patients were unsatisfied.

In the open group,15(50%) patients were satisfied, 8 (26.7%) were equivocally satisfied, 7 (23.3%) patients were un satisfied with cosmetic benefit. The study show that laparoscopic group had better cosmetic results In the study, the mean score for duration of time of surgery was 36.17±12.25 minutes in laparoscopic group and 17.5 ±5.211 minutes in open group.

We conclude that laparoscopic appendectomy is better than open appendectomy in respect to post operative pain, post operative complications, duration of the hospital stay, return to the work, cosmetic benefit. Duration of time of surgery is higher in laparoscopic compared to open appendectomy.

CONCLUSION

After analyzing the all the data's, we found the difference between open and laparoscopic appendectomy.

Laparoscopic appendectomy was better than open appendectomy in a properly prepared and selected patient in terms of

1. Post operative pain
2. Post operative complications like vomiting, wound infection, fever.
3. Duration of the hospital stay.
4. Return to the work.
5. Cosmetic benefit.

Overall, laparoscopic appendectomy is better than open appendectomy in the properly selected patients of acute appendicitis at the cost of increase in the duration of the time of surgery.

In our study, there was no conversation rate from laparoscopic to open appendectomy.

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PROFORMA

PARTICULARS OF PATIENT:

Name: Case no:

Age

Sex: Date of Admission:

Religion: Date of Operation:

IP.No: Date of Discharge:

Address;

Chief Complaints:

- Abdominal pain
- Nausea and vomiting
- Fever

History of presenting complaints:

Pain Abdomen:

- Duration
- Time of onset
- Mode of onset
- Site of pain
- Radiation of pain
- Character of pain
- Aggravating factors
- Relieving factors

Nausea and vomiting:

Fever:

- Duration
- Type
- Severity

Past history:

- Similar complaints
- Abdominal surgery
- Tuberculosis

Personal history:

- Diet
- Appetite
- Sleep
- Bowel/Bladder

Family history:

Menstrual history:

- Menarche
- Lmp
- Menstrual cycles

PHYSICAL EXAMINATION

General physical examination:

Build Pallor

Nourishment, Icterus

Lymhpadenopathy, Cyanosis

Clubbing ,Pedal edema

VITALS:

Pulse

Blood pressure

Respiratory rate

Temperature

ABDOMINAL EXAMINATION

Inspection:

- Contour of abdomen
- Movements of all quadrants with abdomen
- Visible pulsation and peristalsis
- Skin
- Hernial orifices
- Umbilicus
- Scrotum

Palpation:

- Local rise of temperature
- Local Tenderness
- Pointing sign
- Roving`s sign
- Psoas`s sign
- Obturator sign

- Muscle guarding
- Rebound tenderness

Percussion:

Auscultation:

Rectal examination / per vaginal examination:

Examination of scrotum and spermatic cord:

Examination of regional lymph node:

SYSTEMIC EXAMINATION

Cardiovascular system:

Respiratory system:

Nervous system:

Provisional diagnosis:

INVESTIGATIONS:

1. **Routine investigations**

Full blood count

- HB%
- TC
- DC
- ESR

Urinalysis

- Albumin
- Sugar
- Microscopy

2. **Plain X ray abdomen**:

3. **Ultrasound abdomen/pelvis**:

4. **In selected cases**

   CT scan abdomen

   Urea and electrolytes

Diagnosis:

Treatment:

Pre operative management:

- Nil orally
- Injection T.T
- Informed written consent:
- Preparation of parts:
- Antibiotics

Operative management

- Date of operation
- Anesthesia
- Operative procedure: laparoscopic surgery/Open surgery

Post operative period:

- Post operative pain

Pain score:

Grade –0 almost pain relief

Grade –1 slight pain

Grade –2 average pain

Grade –3 more than average

Grade –4 severe pain

- Complication encountered:

Vomiting/nausea

Fever

Wound infection

- Number of days post operative stay :
- Return to normal activity:

Cosmetic benefit

Duration of the time of the surgery

- Histopathological examaination:

Follow up:

CONSENT FORM

For Operation / Anesthesia

I _____ Hosp. No. ____ _____ in my full Senses hereby give my complete consent for _____ or any other Procedure deemed at which is a / and diagnostic procedure / biopsy / Transfusion/operation to be performed on me / my ward _____ age _____ under any anesthesia deemed fit. The nature and risks Involved in the procedure have been explained to me to my satisfaction.

For academic and scientific purpose, the operation / procedure may be Televised or photographed.

Date:

Signature / Thumb Impression

Name:

of patient / Guardian

Designation:

Guardian

Relationship:

Full address

KEYWORDS TO MASTER CHART

S.NO – SERIAL NUMBER

IP.NO – INPATIENT NUMBER

SEX

1 MALE

2 FEMALE

PAIN – RIGHT ILIAC FOSSA PAIN (0-ABSENT, 1- PRESENT)

N/V – NAUSEA AND VOMITING (0-ABSENT, 1- PRESENT)

FEVER (0-ABSENT, 1- PRESENT)

TENDERNESS (0-ABSENT, 1- PRESENT)

GUARDING (0-ABSENT, 1- PRESENT)

PAST H/O PAIN (0-ABSENT, 1- PRESENT)

TC - TOTAL COUNT

DC - DIFFERENTIAL COUNT WITH SHIFT TO LEFT (0-ABSENT, 1- PRESENT)

USG - USG FINDINGS:- INFLAMED APPENDIX (0-ABSENT, 1- PRESENT)

TYPE OF SURGERY (1-LAPAROSCOPY, 2-OPEN SURGERY)

POST OP PAIN - POST OPERATIVE PAIN

1 - NO PAIN

2 - MILD PAIN

3 - MODERATE PAIN

4 - SEVERE PAIN

V - POST OPERATIVE VOMITING (0-ABSENT, 1- PRESENT)

WI - POST OPERATIVE WOUND INFECTION
(0-ABSENT, 1- PRESENT)

F - POST OPERATIVE FEVER (0-ABSENT, 1- PRESENT)

STAY - DURATION OF HOSPITAL STAY IN DAYS

RW - RETURN TO WORK IN DAYS

COSMETIC BENEFIT

1 - UNSATISFIED

2 - EQUIVOCAL

3 - SATISFIED

DURATION - TIME OF SURGERY IN MINUTES

S.NO	IP.NO	AGE	SEX	PAIN	N/V	FEVER	TENDERNESS	GUARDING	PASTH/OPAIN	TC	DC	USG	TYPE OF SURGERY	POSTOPPAIN	V	WI	F	STAY	RW	COSMETIC BENIF	DURATION
1	2265	43	2	1	0	1	1	0	0	7000	1	1	1	1	0	0	0	2	8	3	30
2	17012	45	1	1	1	0	1	0	0	9000	1	1	2	4	1	0	0	6	18	2	25
3	2892	18	1	1	1	1	1	0	0	13000	1	1	1	1	0	0	0	2	10	3	40
4	17754	19	1	1	1	0	1	1	1	12000	1	1	2	2	0	0	0	8	22	2	20
5	3041	35	1	1	1	0	1	1	0	7000	0	1	1	1	0	0	0	3	10	3	40
6	17775	18	1	1	0	1	1	1	1	18900	1	1	2	4	1	1	1	7	18	1	15
7	9304	25	2	1	1	0	1	0	0	9500	1	0	1	2	1	0	0	1	12	3	50
8	18019	17	1	1	1	0	1	0	1	16900	1	0	2	4	0	0	0	8	16	3	20
9	9190	27	1	1	0	1	1	0	0	11000	1	1	1	1	0	0	0	2	8	3	60
10	18852	26	1	1	1	0	1	1	0	14600	1	1	2	4	1	1	1	7	20	1	15
11	10731	28	2	1	1	0	1	0	1	8300	0	1	1	1	0	0	0	1	6	3	55
12	20181	40	2	1	0	1	1	0	0	13200	0	1	2	2	0	0	0	10	16	3	15
13	11978	24	2	1	0	1	1	1	0	7000	1	1	1	2	0	0	1	1	10	3	50
14	20184	22	2	1	1	1	1	1	1	12700	1	0	2	3	0	0	0	9	14	3	10
15	12155	35	1	1	1	0	1	0	0	11400	1	0	1	2	0	0	0	2	11	3	40
16	20942	42	1	1	1	0	1	0	0	11900	1	1	2	4	1	0	0	7	19	2	15
17	16991	20	1	1	1	0	1	0	1	9000	1	1	1	1	0	0	0	3	9	3	45
18	21432	22	2	1	0	1	1	1	1	12700	0	0	2	2	1	1	1	6	24	1	15
19	18463	32	2	1	0	1	1	0	0	2000	1	0	1	2	0	0	0	1	12	3	55
20	22070	25	2	1	1	0	1	1	0	9000	1	1	2	2	0	0	0	8	17	3	25
21	17980	25	1	1	0	0	1	1	0	9700	1	1	1	1	1	0	0	2	13	3	30
22	22092	23	1	1	1	0	1	1	0	6900	1	0	2	4	0	0	0	6	20	2	20

S.NO	IP.NO	AGE	SEX	PAIN	N/V	FEVER	TENDERNESS	GUARDING	PASTH/OPAIN	TC	DC	USG	TYPE OF SURGERY	POSTOPPAIN	V	WI	F	STAY	RW	COSMETIC BENIF	DURATION
23	22803	32	2	1	1	0	1	0	0	13000	1	1	1	1	1	0	0	3	16	3	25
24	24142	40	1	1	1	0	1	1	0	97000	1	1	2	4	0	0	0	7	14	3	10
25	22707	40	1	1	1	0	1	1	0	13200	1	0	1	2	0	0	0	2	8	3	15
26	24325	21	2	1	1	1	1	0	1	70000	1	1	2	3	1	1	1	8	16	2	15
27	25127	18	1	1	1	0	1	0	1	12750	1	0	1	1	0	0	0	1	7	3	15
28	24392	18	2	1	0	0	1	1	0	95000	1	1	2	4	1	0	0	6	18	2	20
29	25150	49	2	1	1	1	1	0	0	60000	0	1	1	2	0	1	1	1	9	2	30
30	24378	48	1	1	0	1	1	0	0	11000	1	1	2	4	1	0	0	6	20	1	25
31	25099	50	2	1	0	0	1	0	0	10500	1	1	1	2	1	0	0	2	10	3	30
32	26371	45	2	1	1	0	1	1	1	13000	1	1	2	4	1	1	1	8	22	3	30
33	26399	19	2	1	1	1	1	1	1	69000	1	0	1	1	0	0	0	3	6	3	40
34	27193	23	1	1	1	0	1	1	0	15000	1	1	2	2	1	0	0	10	16	3	20
35	27197	25	1	1	0	0	1	1	0	82000	1	1	1	1	1	0	1	1	10	3	50
36	27294	19	1	1	0	1	1	0	0	18000	0	0	2	3	0	0	0	8	22	3	10
37	27265	49	2	1	0	1	1	0	0	90000	0	1	1	2	0	0	0	1	11	3	15
38	27285	29	1	1	1	0	1	1	1	19000	1	1	2	3	0	0	0	8	14	3	15
39	27959	28	1	1	1	0	1	0	0	13000	1	1	1	1	0	0	0	2	15	3	20
40	28307	26	1	1	1	1	1	1	0	13200	1	0	2	4	0	0	0	7	14	3	15
41	27952	20	2	1	1	0	1	0	0	15000	1	1	1	1	0	0	1	2	18	2	25
42	28573	45	2	1	1	0	1	0	0	12000	1	1	2	4	1	1	1	6	18	1	15
43	26873	34	2	1	1	0	1	0	0	70000	1	0	1	1	0	0	0	2	7	3	30
44	28	31	1	1	0	1	1	1	1	11	1	1	2	3	0	0	0	10	2	2	15

S.NO	IP.NO	AGE	SEX	PAIN	N/V	FEVER	TENDERNESS	GUARDING	PASTH/OPAIN	TC	DC	USG	TYPE OF SURGERY	POSTOPPAIN	V	WI	F	STAY	RW	COSMETIC BENIF	DURATION
	605									500									0		
45	24769	17	2	1	1	1	1	0	1	8000	1	1	1	1	0	0	0	2	9	3	40
46	29215	20	2	1	1	0	1	1	1	11200	1	0	2	3	0	0	0	7	14	3	10
47	22840	37	2	1	0	1	1	0	1	10000	1	1	1	2	0	0	0	1	8	3	45
48	24246	26	1	1	1	1	1	1	0	12000	1	1	2	2	0	0	0	7	12	3	10
49	23784	29	2	1	0	0	1	1	0	12700	1	0	1	1	0	0	0	1	10	2	35
50	29331	47	1	1	0	0	1	0	0	14000	1	1	2	2	1	1	1	9	16	1	25
51	22868	19	2	1	0	1	1	0	0	13210	1	1	1	1	1	0	0	2	9	3	40
52	31269	21	1	1	1	1	1	0	1	16000	1	0	2	4	1	0	0	9	18	3	20
53	21274	18	2	1	1	1	1	1	1	15000	0	1	1	1	0	0	0	2	6	3	45
54	24329	18	2	1	0	0	1	1	0	18700	1	0	2	4	0	0	1	9	22	3	20
55	21701	18	2	1	1	0	1	0	0	6000	1	0	1	2	0	0	0	1	5	3	30
56	24387	48	1	1	1	0	1	1	0	6000	1	1	2	3	1	1	0	6	16	1	20
57	21538	28	2	1	0	1	1	0	1	9000	1	1	1	1	0	0	0	3	10	2	30
58	26372	45	2	1	0	1	1	1	0	8900	1	1	2	4	1	0	0	9	16	2	15
59	20705	18	1	1	1	0	1	1	0	11200	1	1	1	2	0	0	0	1	5	3	30
60	27199	23	1	1	1	0	1	0	1	7900	1	0	2	3	1	0	0	10	18	3	20